EX1200 SERIES SWITCH CARDS

USER'S MANUAL

P/N: 82-0127-001
June 23rd 2015

VTI Instruments Corp.

2031 Main Street
Irvine, CA 92614-6509
(949) 955-1894

TABLE OF CONTENTS

INTRODUCTION
Certification 6
Warranty 6
Limitation of Warranty 6
Restricted Rights Legend 6
Declaration of Conformity 6
GENERAL SAFETY INSTRUCTIONS 7
Terms and Symbols 7
Warnings 7
SUPPORT RESOURCES 9
SECTION 1 10
INTRODUCTION 10
Overview 10
Plug-in Module Installation 10
Microwave Module Installation 11
Module Shielding/Grounding 11
Scanning 11
Application Environments 12
SECTION 2 13
SWITCHING OVERVIEW 13
General Purpose Switching 13
Power Switching 13
Matrix/Multiplexer Switching 13
RF Switching 14
SECTION 3 15
EX1200 SERIES TERMINAL BLOCKS 15
Introduction 15
Jumper Configuration 16
Terminal Block Receiver 17
Programming Overview 17
Measure Thermistor Temperature 17
Use Thermistor as a Reference Junction 18
SECTION 4 19
EX1200-2001 PLUG-IN MODULE 19
20-Channel 16 Amp SPST Switch 19
Connector Pins and Signals 19
Logical Diagram 21
EX1200-2001 Specifications 22
Relay Breaking Capacity 22
EX1200-2002 PLUG-IN MODULE 23
12-Channel 16 Amp Form C (SPDT) Switch 23
Connector Pins and Signals 23
Logical Diagram 24
EX1200-2002 Specifications 25
EX1200-2007A PLUG-IN MODULE 26
48-Channel 1000 V Multiplexer 26
Connector Pins and Signals 26
Logical Diagram 28
EX1200-2007A Specifications 29
EX1200-2008H PLUG-IN MODULE 30

30-Channel 3 (1 x 10) High-Voltage Multiplexer 30
Connector Pins and Signals 30
Logical Diagram 32
EX1200-2008H Specifications 33
EX1200-3001 PLUG-IN MODULE 34
1 x 64 2-wire Multiplexer 34
Connector Pins and Signals 34
Logical Diagram 36
EX1200-3001 Specifications 38
EX1200-3001DS PLUG-IN MODULE 39
1 x 64 2-wire Multiplexer with Discharge Circuit 39
Connector Pins and Signals 39
Logical Diagram 41
EX1200-3001DS Specifications 42
EX1200-3048 PLUG-IN MODULE 43
48-Channel 300 V/ 2 A Multiplexer 43
Connector Pins and Signals 43
Logical Diagram 45
EX1200-3048 Specifications 47
EX1200-3048S PLUG-IN MODULE 48
48-Channel Two-Wire FET Multiplexer 48
Connector Pins and Signals 48
Logical Diagram 50
EX1200-3048S Specifications 52
EX1200-3072 PLUG-IN MODULE 53
72-Channel 300 V/ 2 A Multiplexer 53
Connector Pins and Signals 53
Logical Diagram 55
EX1200-3072 Specifications 57
EX1200-3096 PLUG-IN MODULE 58
96-Channel 100 V / 0.5 A Two-Wire Multiplexer 58
Connector Pins and Signals 58
Logical Diagram 61
EX1200-3096 Specifications 63
EX1200-3164 PLUG-IN MODULE 64
16 (1x4) 2-wire 300 V/ 2 Amp Multiplexer 64
Connector Pins and Signals 64
Logical Diagram 66
EX1200-3164 Specifications 68
EX1200-3824 PLUG-IN MODULE 69
8 (1 x 24) Solid State, 100V/100mA Multiplexer 69
EX1200-3824 Standard Board 69
EX1200-3824 with Attenuator Option 69
Connector Pins and Signals 70
Logical Diagram 72
EX1200-38TB 73
EX1200-3824 Specifications 76
EX1200-4003 PLUG-IN MODULE 77
Dual 4 x 16 Two-Wire Matrix, 300 V / 2 A 77
Logical Diagram 79
EX1200-4003 Specifications 81
EX1200-4128 PLUG-IN MODULE 82
4 x 128 One-wire Matrix, 150 V/0.5 A 82
Connector Pins and Signals 82
Logical Diagram 86
EX1200-4128 Specifications 88
EX1200-4260 PLUG-IN MODULE 89

2 x 60 2-Wire Matrix 89
Connector Pins and Signals 89
Logical Diagram 93
EX1200-4260 Specifications 94
Relay Breaking Capacity 94
EX1200-4264 PLUG-IN MODULE 95
2 x 64 2-Wire Matrix 95
Connector Pins and Signals 95
Logical Diagram 99
EX1200-4264 Specifications 100
Relay Breaking Capacity 100
EX1200-5001 PLUG-IN MODULE 101
80-Channel 2 Amp Form A (SPST) Switch 101
Connector Pins and Signals 101
Logical Diagram 103
EX1200-5001 Specifications 105
EX1200-5002 PLUG-IN MODULE 106
32-Channel, 2 Amp Form C (SPDT) Switch 106
Connector Pins and Signals 106
Logical Diagram 108
EX1200-5002 Specifications 110
EX1200-5004 PLUG-IN MODULE 111
32-Channel, 5 A SPDT Switch 111
Connector Pins and Signals 111
Logical Diagram 113
EX1200-5004 Specifications 114
378HEX1200-5006 PLUG-IN MODULE 115
40-Channel 2 Amp Form A (SPST) Switch 115
Connector Pins and Signals 115
Logical Diagram 117
EX1200-5006 Specifications 119
EX1200-6101 PLUG-IN MODULE 120
10 SP4T RF Multiplexers, 1.3 GHz 120
Connector Pins and Signals 120
Logical Diagram 122
EX1200-6101 Specifications 123
EX1200-6102 PLUG-IN MODULE 124
17-Channel (1x2) Coaxial Switches, 1.3GHz 124
Connector Pins and Signals 124
Logical Diagram 126
EX1200-6102 Specifications 127
EX1200-6111 PLUG-IN MODULE 128
5-Channel SP4T Coaxial Switch 128
Connector Pins and Signals 128
Logical Diagram 130
EX1200-6111 Specifications 131
EX1200-6216 PLUG-IN MODULE 132
Dual 1 x 16 RF Mux, 1 GHz Switch 132
Connector Pins and Signals 132
Logical Diagram 134
EX1200-6216 Specifications 135
EX1200-6216HV PLUG-IN MODULE 136
Dual (1x16) 500 V 250 MHz Multiplexers 136
Connector Pins and Signals 136
Logical Diagram 138
EX1200-6216HV Specifications 139
EX1200-6301 PLUG-IN MODULE 140

4 Channel SP4T, RF Multiplexer, 50 Ω, 3 GHz 140
Connector Pins and Signals 140
Logical Diagram 141
EX1200-6301 Specifications 142
EX1200-6301T PLUG-IN MODULE 143
4 Channel SP4T, Self-terminated RF Multiplexer, 50 Ω, 3 GHz 143
Connector Pins and Signals 143
Logical Diagram 144
EX1200-6301T Specifications 145
EX1200-7100 PLUG-IN MODULE 146
DC - 26 GHz Microwave Switch Carrier and Relay Driver 146
Front Panel Enclosure 146
Microwave Switch Modules 147
7102 Microwave Module 147
7104 Microwave Module 148
7106 Microwave Module 148
7122 Microwave Module 149
Installing a Switch Module 149
EX1200-7100 Carrier Front Panel Connectors 150
EX1200-7100 Soft Front Panel 150
EX1200-7100 Specifications 152
APPENDIX A 153
POWER CONSUMPTION AND WEIGHT 153
Reference Tables 153
APPENDIX B 155
SWITCH CARD ACCESSORIES 155
List of Accessories 155
26-pin Connector 155
41-pin Connector 156
104-pin Connector 156
160-pin Connector 157
200-pin Connector 157
50-pin Connector 157

CERTIFICATION

VTI Instruments Corp. (VTI) certifies that this product met its published specifications at the time of shipment from the factory. VTI further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (formerly National Bureau of Standards), to the extent allowed by that organization's calibration facility, and to the calibration facilities of other International Standards Organization members. Note that the contents of this document are subject to change without notice.

WARRANTY

The product referred to herein is warranted against defects in material and workmanship for a period of one year from the receipt date of the product at customer's facility. The sole and exclusive remedy for breach of any warranty concerning these goods shall be repair or replacement of defective parts, or a refund of the purchase price, to be determined at the option of VTI.

For warranty service or repair, this product must be returned to a VTI Instruments authorized service center. The product shall be shipped prepaid to VTI and VTI shall prepay all returns of the product to the buyer. However, the buyer shall pay all shipping charges, duties, and taxes for products returned to VTI from another country.

VTI warrants that its software and firmware designated by VTI for use with a product will executeits programming when properly installed on that product. VTI does not however warrant that the operation of the product, or software, or firmware will be uninterrupted or error free.

LIMITATION OF WARRANTY

The warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, buyer-supplied products or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

VTI Instruments Corp. shall not be liable for injury to property other than the goods themselves. Other than the limited warranty stated above, VTI Instruments Corp. makes no other warranties, express, or implied, with respect to the quality of product beyond the description of the goods on the face of the contract. VTI specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

RESTRICTED RIGHTS LEGEND

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subdivision (b)(3)(ii) of the Rights in Technical Data and Computer Software clause in DFARS 252.227-7013.

DECLARATION OF CONFORMITY

The declaration of conformity for the EX1200 Series Mainframe applies to all of its available plug-in modules and options. For specifics, refer to the *EX1200 Series Mainframe User's Manual*.

VTI Instruments Corp.
2031 Main Street
Irvine, CA 92614-6509 U.S.A.

GENERAL SAFETY INSTRUCTIONS

Review the following safety precautions to avoid bodily injury and/or damage to the product. These precautions must be observed during all phases of operation or service of this product. Failure to comply with these precautions, or with specific warnings elsewhere in this manual, violates safety standards of design, manufacture, and intended use of the product.

Service should only be performed by qualified personnel.

TERMS AND SYMBOLS

These terms may appear in this manual:

WARNING Indicates that a procedure or condition may cause bodily injury or death.

CAUTION Indicates that a procedure or condition could possibly cause damage to equipment or loss of data.

These symbols may appear on the product:

ATTENTION - Important safety instructions

Frame or chassis ground

Indicates that the product was manufactured after August 13, 2005. This mark is placed in accordance with *EN 50419, Marking of electrical and electronic equipment in accordance with Article 11(2) of Directive 2002/96/EC (WEEE).* End-of-life product can be returned to VTI by obtaining an RMA number. Fees for take_2ack and recycling will apply if not prohibited by national law.

WARNINGS

Follow these precautions to avoid injury or damage to the product:

Use Proper Power Cord

The power cable provided with this instrument meets the required regulatory and statutory safety standards as indicated by this product's declaration of conformity. VTI recommends that the power cord provided be used with the instrument that it is provided with. If a different power cord is must to be used, however, it is the responsibility of the user to select a power cord that meets any and all regulatory and statutory requirements for their industry and country.

Use Proper Power Source

To avoid electrical overload, electric shock, or fire hazard, do not use a power source that applies other than the specified voltage.

Power Consumption

Prior to using the EX1200 series switch cards, it is imperative that the power consumption of all cards that will be installed in the mainframe be calculated on all power supply rails. Power consumption information is provided in Appendix A. Information regarding power consumption calculations can be found in the EX1200 Series User's Manual (P/N: 82-0127-000). ***Failure to do so may result in damaging the switch card and the mainframe***.

WARNINGS (CONT.)

Avoid Electric Shock

To avoid electric shock or fire hazard, do not operate this product with the covers removed. Do not connect or disconnect any cable, probes, test leads, etc. while they are connected to a voltage source. Remove all power and unplug unit before performing any service. ***Service should only be performed by qualified personnel.***

Ground the Product

This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground.

Operating Conditions

To avoid injury, electric shock or fire hazard:

- Do not operate in wet or damp conditions.
- Do not operate in an explosive atmosphere.
- Operate or store only in specified temperature range.
- Provide proper clearance for product ventilation to prevent overheating.
- DO NOT operate if any damage to this product is suspected. ***Product should be inspected or serviced only by qualified personnel.***

Improper Use

The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.
Conformity is checked by inspection.

SUPPORT RESOURCES

Support resources for this product are available on the Internet and at VTI Instruments customer support centers.

VTI Instruments Corp.
World Headquarters

VTI Instruments Corp.
2031 Main Street
Irvine, CA 92614-6509

Phone: (949) 955-1894
Fax: (949) 955-3041

VTI Instruments
Cleveland Instrument Division

5425 Warner Road
Suite 13
Valley View, OH 44125

Phone: (216) 447-8950
Fax: (216) 447-8951

VTI Instruments
Lake Stevens Instrument Division

3216 Wetmore Avenue, Suite 1
Everett, WA 98201

Phone: (949) 955-1894
Fax: (949) 955-3041

VTI Instruments, Pvt. Ltd.
Bangalore Instrument Division

74, 75, Millers Road
Bangalore – 560 052
India

Phone: +91 80 4040 7900
Phone: +91 80 4162 0200
Fax: +91 80 4170 0200

Technical Support

Phone: (949) 955-1894
Fax: (949) 955-3041
E-mail: support@vtiinstruments.com

Visit http://www.vtiinstruments.com for worldwide support sites and service plan information.

SECTION 1

INTRODUCTION

OVERVIEW

Signal switching is at the heart of every automated test system. It is responsible for routing signals of interest between test system instruments and the device under test (DUT). The purpose of the testing is to improve product quality. The switch distributes instrument I/O, which can reduce overall system cost. Since switching is effectively an extension of the instrument, it should be transparent to the overall system. EX1200 switching products employ extensive signal shielding and high-quality relays to ensure that the test system is "minimally aware" of the switch's presence.

PLUG-IN MODULE INSTALLATION

All EX1200 series switch cards must be installed into an EX1200 series mainframe to be used. The mainframe operates on 90 V to 250 V at 50 Hz/60 Hz which is used to supply the cards the dc voltages required for the cards to function properly. Before installing a plug-in module into an EX1200 series mainframe, make sure that the mainframe is powered down. Insert the module into the base unit by orienting the module so that the circuit board of the module can be inserted into the slot of the base unit. Position the cover so that it fits into the module's slot groove. Once the module is properly aligned, push the module back and firmly insert it into the backplane connector.

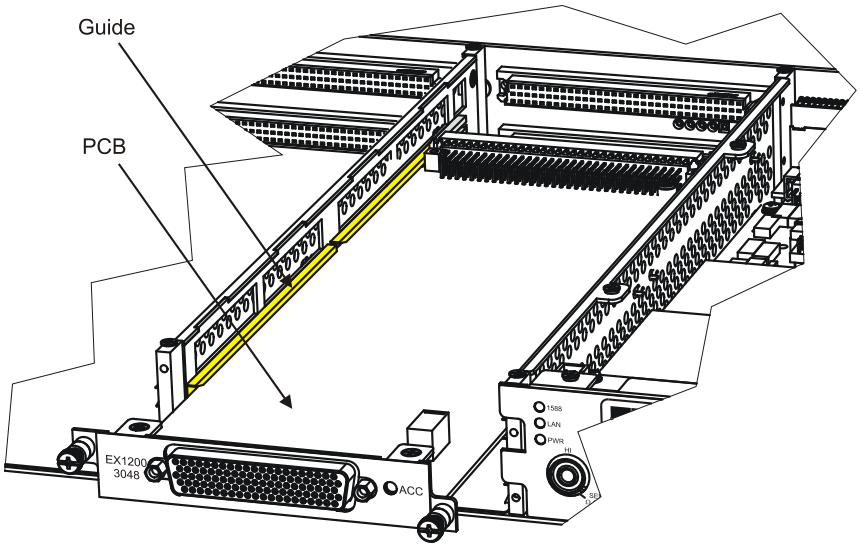


FIGURE 1-1: MODULE INSTALLATION (EX1200-3048 SHOWN)

NOTE	To maximize air flow for cooling, blanking panels (P/N: 41-0472-012) should be installed into the empty slots of EX1200 mainframes.

The maximum safe voltage for an EX1200 system is determined by the plug-in card with the lowest voltage rating.

MICROWAVE MODULE INSTALLATION

For the EX1200-7100 Plug-in Module, microwave switch modules can be installed. Before installing a switch module into the EX1200-7100 carrier, ensure that the mainframe is powered down. Insert the switch module into the desired slot of the carrier. Slide the module into the mating connector at the rear of the carrier using the two guide pins to ensure proper orientation. Once the guide pins are aligned, push the module firmly mating connector. The module is then sMUXred to the front panel of the carrier using four socket head cap screws.

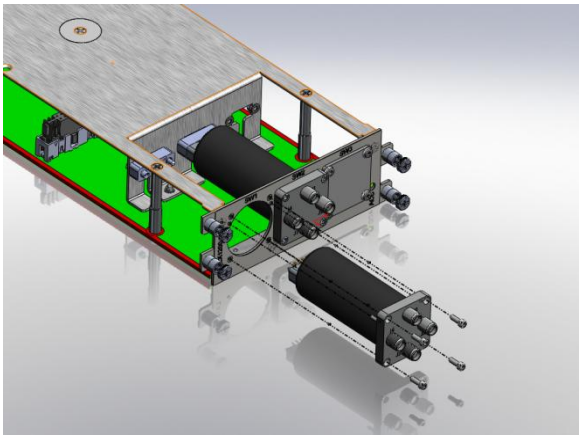


FIGURE 1-2: MICROWAVE SWITCH INSTALLATION

MODULE SHIELDING/GROUNDING

Most EX1200 modules incorporate an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. If this feature is present on a module, the pins are identified in the module appendix in the *Connector Pins and Signals* table and the signal is noted as "SHIELD".

Leaving the SHIELD pins unconnected may have detrimental effects on signal crosstalk and isolation. If no cable shield connection is available, chassis ground may be used to attach the SHIELD pins.

Many plug-in modules also incorporate ground pins, labeled "GND_C" or simply "GND". These pins tie the module to chassis ground. Note that the SHIELD pins are not tied to ground and have no electrical connections.

SCANNING

The EX1200 switch cards provide scanlist functionality to maximize measurement throughput. The scanlist allows the relay state to be advanced by a hardware trigger rather than requiring the state of the relay to be updated manually during program execution. Doing this eliminates the need to wait on the controller to wait for a state to be settled and send the command to update relays providing maximum throughput performance

APPLICATION ENVIRONMENTS

The EX1200 switching platform supports a wide variety of application environments. The switches can be manually controlled through the embedded, web-based soft front panel or programmatically on a Windows-based PC through the provided IVI VTEXSwitch driver controlled on most platforms through the C++ driver. The EX1200 also allows for integration into NI's Switch Executive for high-level configuration and control.

SECTION 2

SWITCHING OVERVIEW

GENERAL PURPOSE SWITCHING

When selecting switch cards for a test system, the following should be taken into consideration:

- Power Specifications
- Minimum Contact Rating
- Switching Time
- Bandwidth

The relay must be able to accommodate both the voltage, current, and total power that will be switched and all of these specifications should be checked before making a selection. The minimum contact rating and switching time specifications are important in systems where relays will be opened and closed many times throughout the test. The faster the switch performs, the faster the test will finish. The bandwidth specification indicates the frequencies the switch is able to switch. Interchannel isolation and crosstalk are also affected by the frequency of the signals being switched.

POWER SWITCHING

The EX1200-200x high-power switch cards provide high-power switching in a small form factor. The EX1200-2001 and the EX1200-2002 are the only switch modules in their class with the ability to switch up to 16 A. As such, the high-power cards are an ideal solution for applications such as: ac line power switching, switching of dc or power supplies, controlling or driving relays for industrial machines (robotics, numerical control machines), automotive engine control, and solenoid switching. These switch cards also include a front panel interrupt line which will open all relays in the module to provide safety. They can also be used in the setup phase of a scanlist to switch power to and from a DUT before reading data into a multiplexer to the DMM.

MATRIX/MULTIPLEXER SWITCHING

Matrix and multiplexer cards allow the user the ability to combine multiple in the same chassis to create larger switching systems: For matrix cards, multiple cards can be combined by connecting either rows or columns of the relay together. For example, by placing six EX1200-4128's in a chassis and connecting all four rows of each module to the EX1200 backplane, a 4 x 768 can be formed is a 1U rack with no external wiring.

To improve bandwidth specifications, it is important to utilize the stub breaking relays that are incorporated into most matrix and multiplexer cards. These relays typically separate banks of relays from each other or isolate the switch card from the DMM backplane. By keeping these relays open, the length a signal must travel, and the amount of resistance it will encounter, can be reduced, increasing the path's bandwidth. Examples of these relays are shown in Figure 2-1.

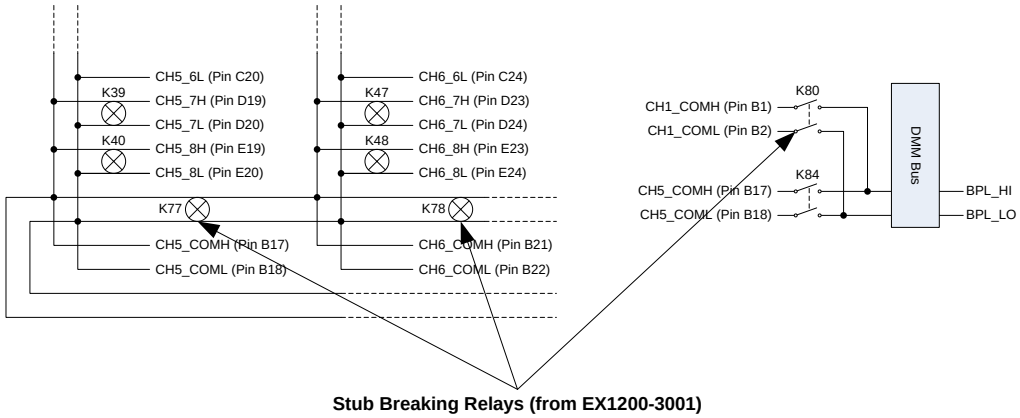


FIGURE 2-1: STUB BREAKING RELAYS

When programming switches to perform 2-wire and 4-wire measurements, the 2-wire and 4-wire channel names must be used. For "standard" matrix cards (i.e. 2-banks of paired H/L inputs), the 2- and 4-wire name, the 1-wire names is used as the base. The convention is illustrated in Table 2-1 below:

1-Wire Channel Name	2-Wire Channel Name	4-Wire Channel Name
CH1_1L	CH1_1	CH_1
CH1_1H		
CH2_1L	CH2_1	
CH2_1H		
CH1_2L	CH1_2	CH_2
CH1_2H		
CH2_2L	CH2_2	
CH2_2H		

TABLE 2-1: STANDARD 2- AND 4-WIRE NAMING CONVENTIONS

For "non-standard" matrix cards, this convention cannot be used, however. For these switch cards, the full 2- and 4-wire names are provided following the 1-wire discussion for those cards.

RF SWITCHING

The EX1200-6xxx cards can be used for high bandwidth applications such as switching to/from oscilloscopes and function generators. These modules provide a maximum of 10 W of switching power and the stub effects are terminated to ensure maximum signal fidelity.

SECTION 3

EX1200 SERIES TERMINAL BLOCKS

INTRODUCTION

VTI offers differential and single-ended terminal blocks (TBs) for many of the EX1200 series switch cards. The terminal blocks can be used to simplify cabling. In addition to this, the differential terminal blocks also provide users an on-board thermistor for cold junction compensation (CJC) when making temperature measurements. Signal pin mapping is provided for the terminal blocks with its associated switch card.

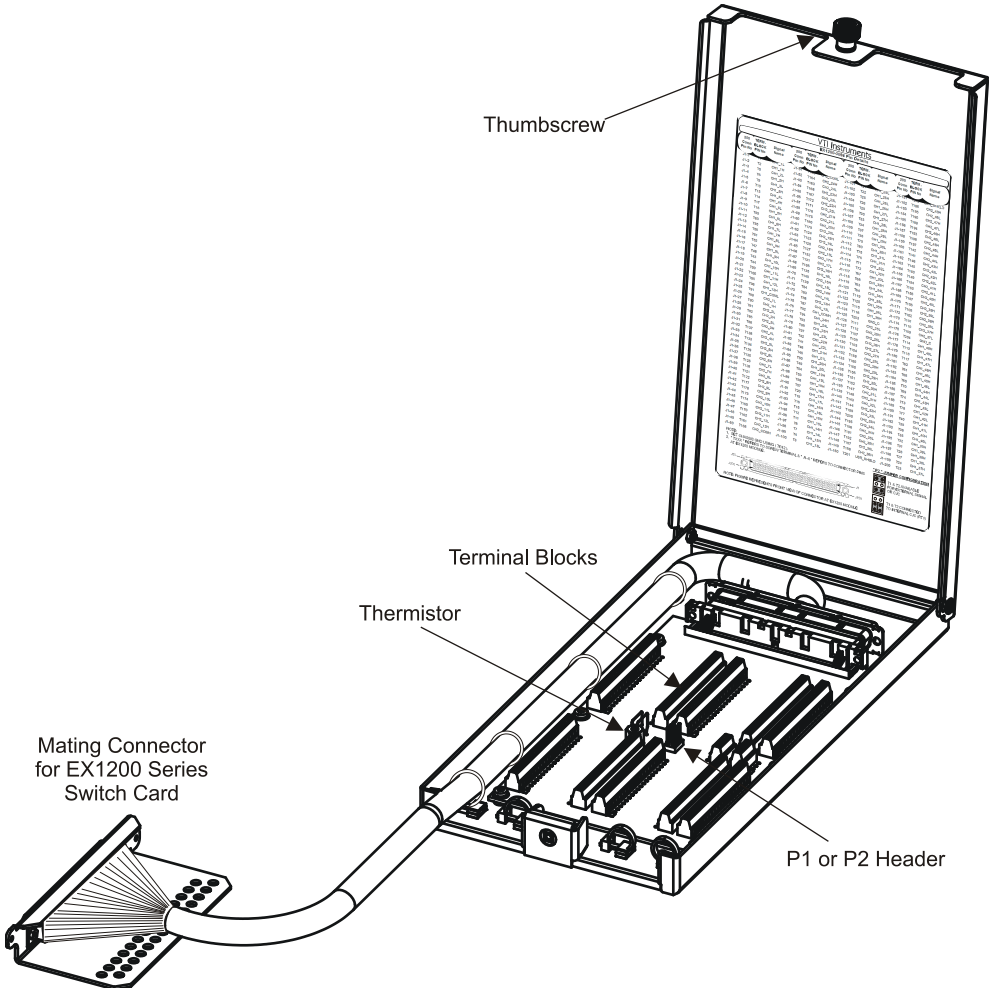


FIGURE 3-1: EX1200-TB200

JUMPER CONFIGURATION

Differential TBs have the ability to use an on-board 10 kΩ thermistor (RT1) to connect to an instrument when temperature measurements are being made. Before doing so, the P2 header must be configured correctly. The function of this header is to make a connection between the T1 and T2 terminals on the terminal block, the CJC (RT1) sensor, and two other TB terminals.

In the default position, pin 1 is shorted to pin 6 and pins 3 and 4 are shorted (see Figure 3-2) on P2. This configuration allows T1 and T2 to be used in any type of measurement. When configured to one of the other two configurations, the channels associated with these terminals are dedicated to making temperature measurements and cannot be used in any other manner.

To use RT1 for CJC measurements, short pin 2 to pin 3 and pin 4 to pin 5. This will join T1 and T2 to L_VS and H_VS. The terminal numbers for L_VS and H_VS differ between TB modules and are documented with the terminal block pin mapping information for each switch card.

To use an external sensor for temperature measurements, short pin 1 to pin 2 and pins 5 and 6 on P2. This joins T1 and T2 to RL_I and RH_I. For the TB104 and TB160, the external sensor should be connected to T1 and T2 or T161 and T162 when in this configuration. For the TB200, the external sensor can be connected T1 and T2 or T181 and T182 when in this configuration.

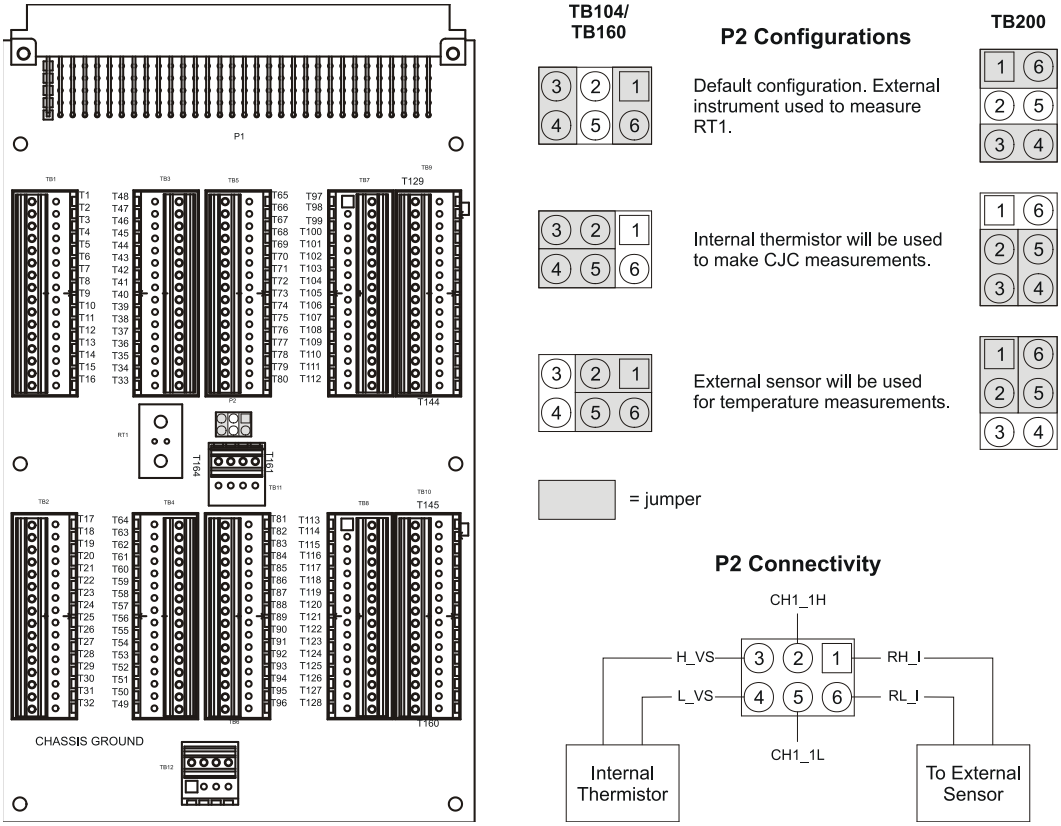


FIGURE 3-2: P2 JUMPER CONFIGURATION DIAGRAM

NOTE	The actual switch card channel that is dedicated to temperature measurement through the P2 header is dependent on the channel to which T1 and T2 of the terminal block are connected. Figure 3-2, an EX1200-TB160-1 is shown where T1 and T2 are connected to CH1_1L and CH1_1H, respectively. The channels are indicated in the Terminal Block Pin Mapping discussion for each switch card.

TERMINAL BLOCK RECEIVER

The EX1200-TBR chassis is a 1U receiver capable of housing six terminal blocks. The EX1200-TBR ships with rubber feet for table top installations, but may be fitted with rackmount ears for installation into a test rack (P/N: 70-0367-010).

To install a terminal block into the EX1200-TBR, insert the flanges on the side of the terminal block into the guide rails of the desired slot. Continue to push the terminal block into the receiver until it is sMUXred by the rear-locking latch of the receiver. To remove the terminal block from the EX1200-TBR, hold the center thumbscrew on the terminal block, then pull the terminal block from the receiver.

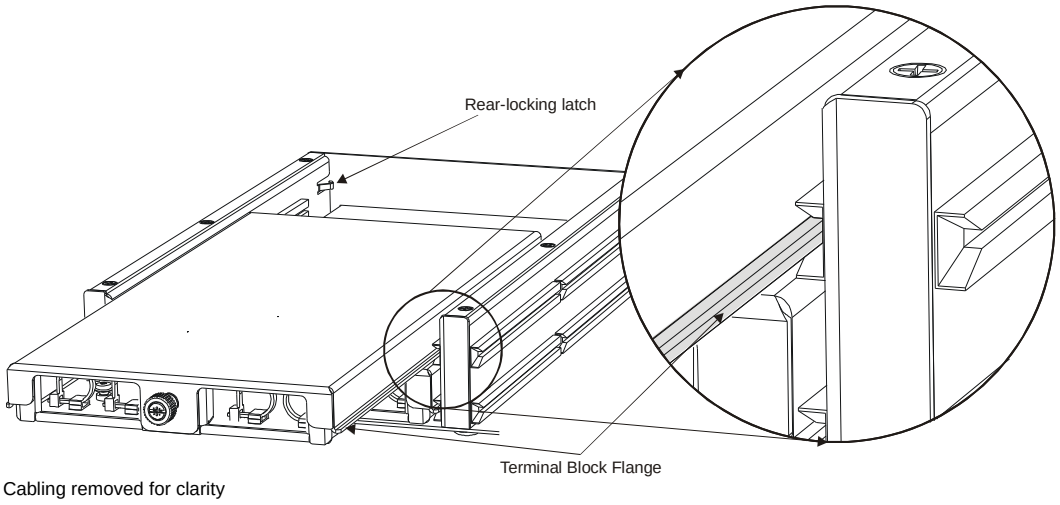


FIGURE 3-3: TERMINAL BLOCK INSTALLATION INTO THE EX1200-TBR

PROGRAMMING OVERVIEW

To measure the thermistor temperature, first ensure that the P2 jumper has been configured properly (see *Jumper Configuration* for more detail). Next, a scan list is developed which scans CH1_1. In the following programming overview, a method for taking measurements using the on-board thermistor will be provided.

Two scenarios will be provided: one where only the thermistor temperature is measured and one where the RT1 is used as a reference junction and other channels make temperature measurements. In the first example, the user can only measure the thermistor temperature at CH1_1. In the second example, the user can measure the thermistor temperature at CH1_1 and can also measure temperature on another channel which uses the CH1_1 as a reference junction.

Note that, in these examples, it is assumed that the EX1200 DMM is being used and that the P2 jumper has been configured appropriately.

Measure Thermistor Temperature

Either the VTEXScanner driver or the scanner soft front panel can be used to perform this sequence.

1) Set the DMM to measure temperature using the thermistor.
   a. Set the DMM function to **Temperature**.
   b. Set the transducer type to **Thermistor**.
   c. Set the thermistor resistance to **10000** (the thermistor is 10 kΩ).

2) Save and provide a name for the DMM configuration for the scanning purposes (here, **TEMP** is used).
3) Setup the scanlist
   a. Add a scan step with a sweep phase that scans CH1_1 using the previously saved configuration (e.g. CH1_1=**TEMP**)
   b. The setup phase can be ignored for this example.
4) Initiate & Read
   a. Initiate the scan
   b. Read back the data

Use Thermistor as a Reference Junction

1) Set the DMM to measure temperature using the thermistor.
   a. Set the DMM function to **Temperature**.
   b. Set the transducer type to **Thermistor**.
   c. Set the thermistor resistance to **10000** (the thermistor is 10 kΩ).
   d. Set the **isReferenceJunction** parameter to **True**.
2) Save and provide a name for the DMM configuration for the scanning purposes.
3) Set the DMM to measure temperature using a Type K thermocouple (any thermocouple type can be selected here, but Type K below).
   a. Set the DMM function to **Temperature**.
   b. Set the transducer type to **Thermocouple**.
   c. Set the thermocouple type to **Type K**.
   d. Set the reference type to **External**.
   e. Set the **isReferenceJunction** parameter to **False**.
4) Save and provide a name for the DMM configuration for the scanning purposes.
5) Setup the scanlist
   a. Add a scan step with a sweep phase that scans CH1_1 using the first saved configuration. (e.g. CH1_1=**RefJunction**).
   b. Add another scan step with a sweep phase that scans another channel (e.g. CH1_2=**TEMP**).
   c. The setup phase can be ignored for this example.
6) Initiate & Read
   a. Initiate the scan
   b. Read back the data

SECTION 4

EX1200-2001 PLUG-IN MODULE

20-CHANNEL 16 AMP SPST SWITCH

The EX1200-2001 and EX1200-2002 are the only switch modules in their class with the ability to switch up to 16 A. Some applications include: ac line power switching, switching of dc or ac power supplies, control or driving relays for industrial machines (robotics, numerical control machines), automotive engine control, and solenoid switching.

Since these modules typically switch power to the UUT or interface, the digital input lines on the EX1200 series mainframes support the ability to force all relays automatically to their normally open state if a fault condition occurs. This approach instantly removes all power to the UUT or interface. These modules can be automatically configured in the setup phase at the beginning of each scan step to facilitate test sequencing and control.

The EX1200-2001 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-2 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

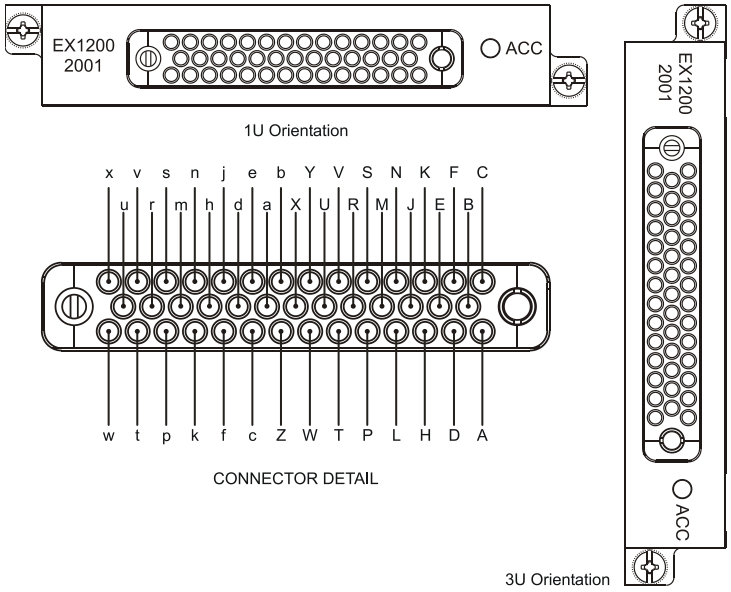

EX1200
2001
ACC
1U Orientation
x v s n j e b Y V S N K F C
u r m h d a X U R M J E B
w t p k f c Z W T P L H D A
CONNECTOR DETAIL
EX1200
2001
ACC
3U Orientation

FIGURE 4-1: EX1200-2001 FRONT PANEL (FRONT VIEW)

Pin	Signal	Pin	Signal
A	CH_1NO	**Z**	CH_11COM
B	CH_1COM	**a**	CH_12NO
C	CH_2NO	**b**	CH_12COM
D	CH_2COM	**c**	CH_13NO
E	CH_3NO	**d**	CH_13COM
F	CH_3COM	**e**	CH_14NO
H	CH_4NO	**f**	CH_14COM
J	CH_4COM	**h**	CH_15NO
K	CH_5NO	**j**	CH_15COM
L	CH_5COM	**k**	CH_16NO
M	CH_6NO	**m**	CH_16COM
N	CH_6COM	**n**	CH_17NO
P	CH_7NO	**p**	CH_17COM
R	CH_7COM	**r**	CH_18NO
S	CH_8NO	**s**	CH_18COM
T	CH_8COM	**t**	CH_19NO
U	CH_9NO	**u**	CH_19COM
V	CH_9COM	**v**	CH_20NO
W	CH_10NO	**w**	CH_20COM
X	CH_10COM	**x**	SHIELD
Y	CH_11NO		

NOTE Pin x is connected to a shield layer located directly under the relays and connecting wires. Optimum performance is obtained when Pin x is tied to system or chassis ground and the front panel mounting screws are sMUXred to the chassis frame.

TABLE 4-1: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

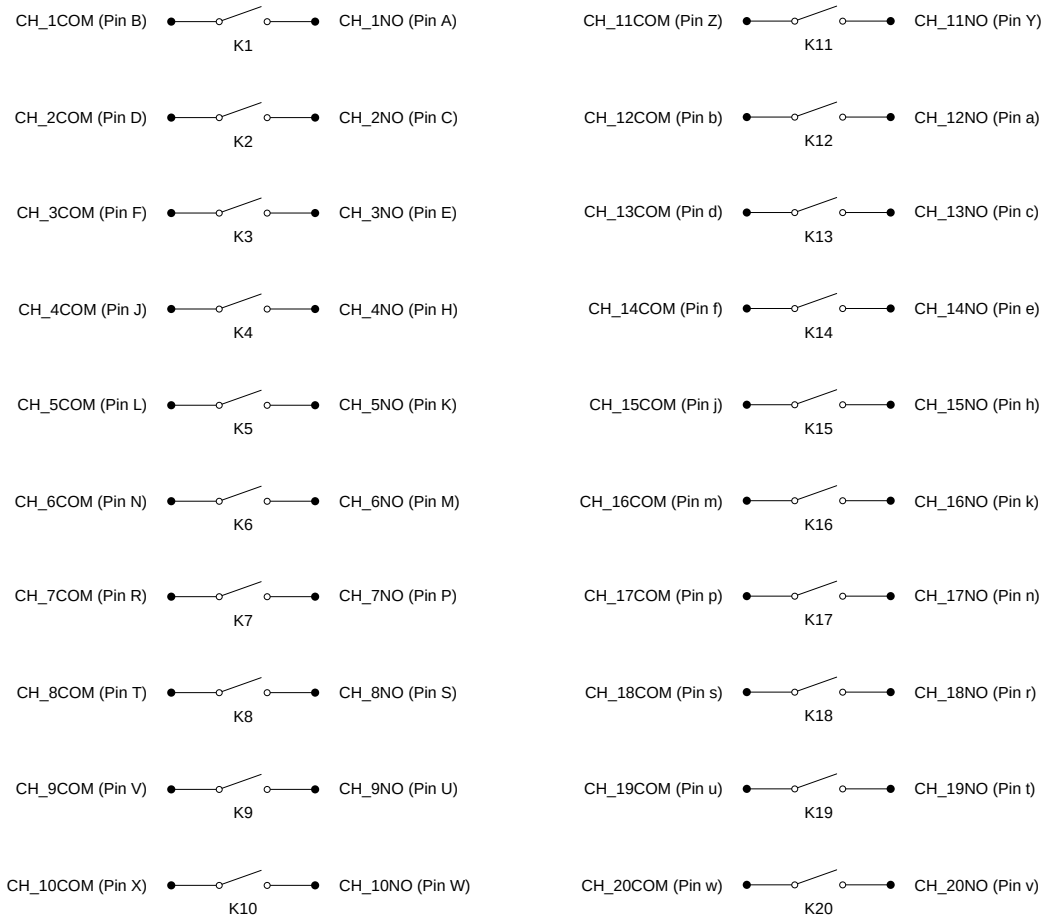


FIGURE 4-2: EX1200-2001 LOGICAL DIAGRAM

EX1200-2001 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	20 SPST
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	250 V ac rms, 125 V dc
MAXIMUM SWITCHING CURRENT	
	16 A
MAXIMUM SWITCHING POWER	
	480 W dc, 2000 VA per channel (see the Figure 4-3 for more information)
MINIMUM CONTACT RATING*	
	12 V dc, 0.1 A
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	5×10^7
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 10 ms
PATH RESISTANCE	
	< 100 mΩ
INSULATION RESISTANCE	
	$>1x10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 50 µV
CAPACITANCE	
Open channel	<20 pF
Channel-mainframe	<75 pF
BANDWIDTH (-3 dB)	
	40 MHz (typical)
INSERTION LOSS (TYPICAL)	
100 kHz	< 0.2 dB
1 MHz	< 0.5 dB
10 MHz	< 1.0 dB
CROSSTALK (TYPICAL)	
100 kHz	< -48 dB
1 MHz	< -33 dB
10 MHz	< -19 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

RELAY BREAKING CAPACITY

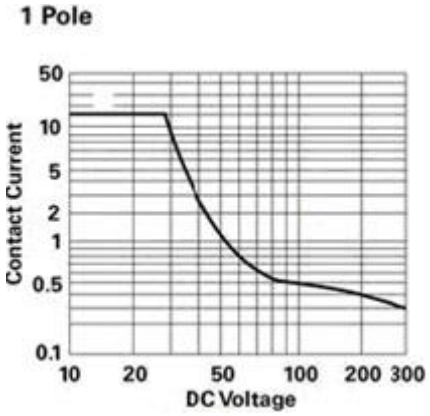


FIGURE 4-3: RELAY BREAKING CAPACITY

EX1200-2002 PLUG-IN MODULE

12-CHANNEL 16 AMP FORM C (SPDT) SWITCH

The EX1200-2001 and EX1200-2002 are the only switch modules in their class with the ability to switch up to 16 A. Some applications include: ac line power switching, switching of dc or ac power supplies, control or driving relays for industrial machines (robotics, numerical control machines), automotive engine control, and solenoid switching.

Since these modules typically switch power to the UUT or interface, the digital input lines on the EX1200 series mainframes support the ability to force all relays automatically to their normally open state if a fault condition occurs. This approach instantly removes all power to the UUT or interface. These modules can be automatically configured in the setup phase at the beginning of each scan step to facilitate test sequencing and control.

The EX1200-2002 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-5 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

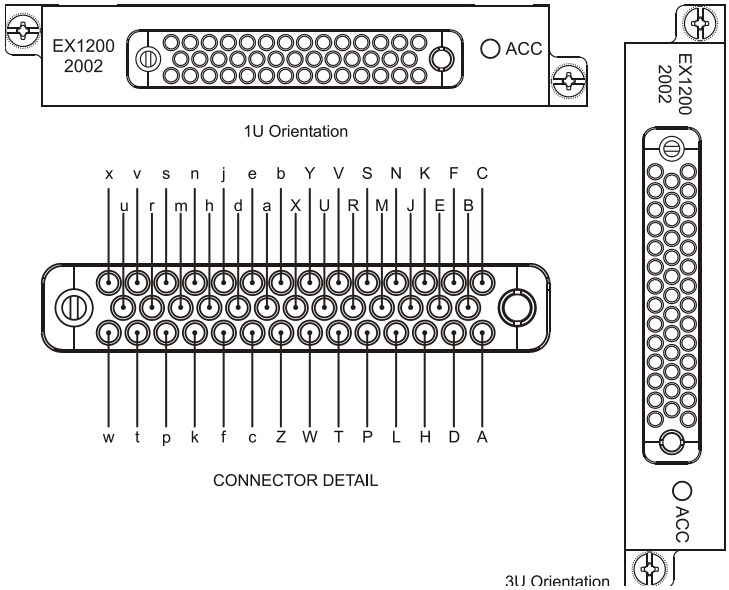

EX1200
2002
ACC
1U Orientation
x v s n j e b Y V S N K F C
u r m h d a X U R M J E B
w t p k f c Z W T P L H D A
CONNECTOR DETAIL
EX1200
2002
ACC
3U Orientation

FIGURE 4-4: EX1200-2002 FRONT PANEL (FRONT VIEW)

Pin	Signal	Pin	Signal
A	CH_1NO	**Z**	CH_8NO
B	CH_1COM	**a**	CH_8COM
C	CH_1NC	**b**	CH_8NC
D	CH_2NO	**c**	CH_9NO
E	CH_2COM	**d**	CH_9COM
F	CH_2NC	**e**	CH_9NC
H	CH_3NO	**f**	CH_10NO
J	CH_3COM	**h**	CH_10COM
K	CH_3NC	**j**	CH_10NC
L	CH_4NO	**k**	CH_11NO
M	CH_4COM	**m**	CH_11COM
N	CH_4NC	**n**	CH_11NC
P	CH_5NO	**p**	CH_12NO
R	CH_5COM	**r**	CH_12COM
S	CH_5NC	**s**	CH_12NC
T	CH_6NO	**t**	UNUSED
U	CH_6COM	**u**	UNUSED
V	CH_6NC	**v**	UNUSED
W	CH_7NO	**w**	UNUSED
X	CH_7COM	**x**	SHIELD
Y	CH_7NC		

NOTE Pin x is connected to a shield layer located directly under the relays and connecting wires. Optimum performance is obtained when Pin x is tied to system or chassis ground and the front panel mounting screws are sMUXred to the chassis frame.

TABLE 4-2: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

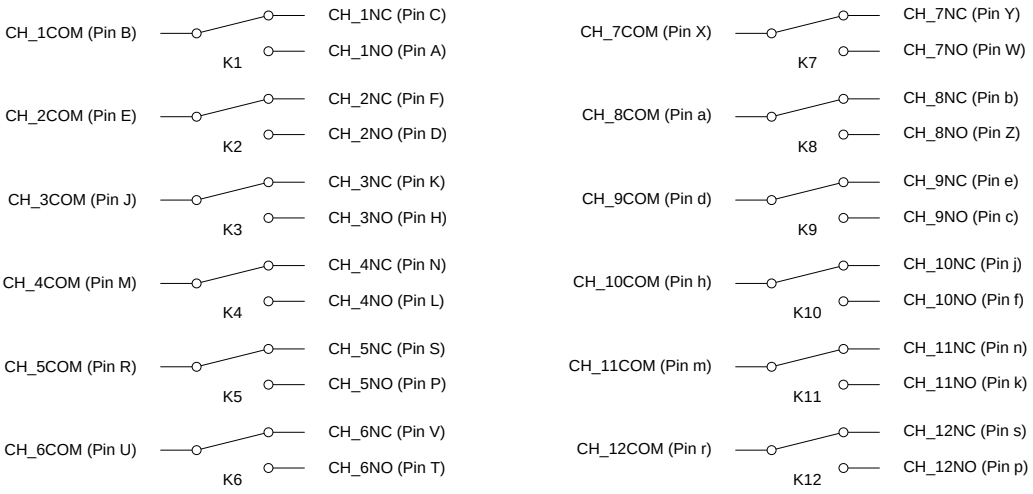


FIGURE 4-5: EX1200-2002 LOGICAL DIAGRAM

EX1200-2002 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	12 SPDT
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	250 V ac rms, 125 V dc
MAXIMUM SWITCHING CURRENT	
	16 A
MAXIMUM SWITCHING POWER	
	480 W dc, 2000 VA per channel
MINIMUM CONTACT RATING*	
	12 V dc, 0.1 A
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	5×10^7
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 10 ms
PATH RESISTANCE	
	< 100 mΩ
INSULATION RESISTANCE	
	$>1x10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 50 µV
CAPACITANCE	
Open channel	<20 pF
Channel-mainframe	<75 pF
BANDWIDTH (-3 dB)	
	40 MHz (typical)
INSERTION LOSS (TYPICAL)	
100 kHz	< 0.2 dB
1 MHz	< 0.5 dB
10 MHz	< 1.0 dB
CROSSTALK (TYPICAL)	
100 kHz	<-48 dB
1 MHz	<-33 dB
10 MHz	<-19 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-2007A PLUG-IN MODULE

48-CHANNEL 1000 V MULTIPLEXER

The EX1200-2007A is designed for scanning multiple high-voltage points to a common bus in either 1- or 2- wire configurations. It consists of two individual (1 x 12) 2-wire multiplexers, or dual (1 x 24) 1-wire multiplexers that can be interconnected under program control (via bussing relays) to configure larger multiplexers as required. This reduces the need for external cabling and helps reduce unterminated stub effects.

When switching high voltages, the need for signal shielding becomes critical. The EX1200-2007A has been designed to include large shield planes that reduce crosstalk and voltage spikes to adjacent channels.

Up to 144 2-wire channels can be accommodated in a single EX1200 series mainframe for maximum density, or combined with other EX1200 series modules to create a flexible system switch.

CONNECTOR PINS AND SIGNALS

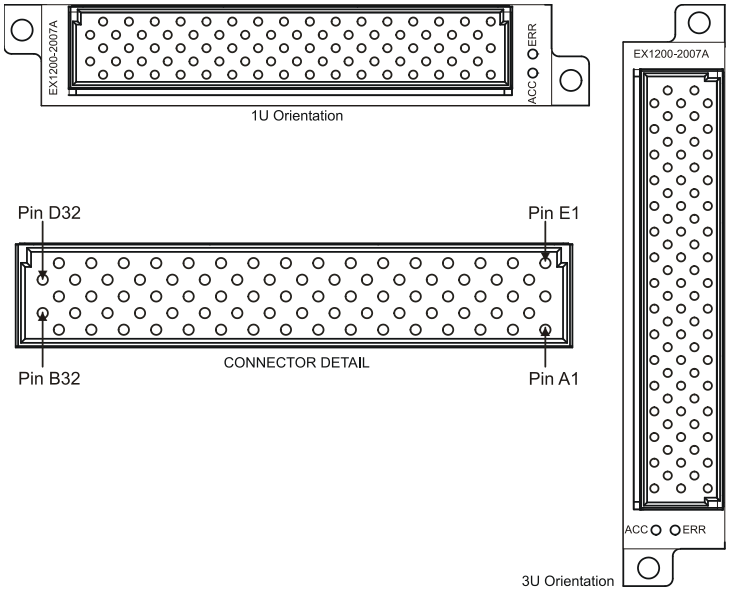


FIGURE 4-6: EX1200-2007A FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
1	SHIELD	**2**	CH2_1L	**1**	CH2_1H	**2**	UNUSED	**1**	CH1_1W
3	SHIELD	**4**	CH2_2L	**3**	CH2_2H	**4**	CH1_COMH	**3**	CH1_COML
5	SHIELD	**6**	CH2_3L	**5**	CH2_3H	**6**	CH1_1H	**5**	CH1_1L
7	SHIELD	**8**	CH2_4L	**7**	CH2_4H	**8**	CH1_2H	**7**	CH1_2L
9	SHIELD	**10**	CH2_5H	**9**	CH2_5L	**10**	CH1_3H	**9**	CH1_3L
11	SHIELD	**12**	CH2_6H	**11**	CH2_6L	**12**	CH1_4H	**11**	CH1_4L
13	SHIELD	**14**	CH2_7H	**13**	CH2_7L	**14**	CH1_5H	**13**	CH1_5L
15	SHIELD	**16**	CH2_8H	**15**	CH2_8L	**16**	CH1_6H	**15**	CH1_6L
17	SHIELD	**18**	CH2_9H	**17**	CH2_9L	**18**	CH1_7H	**17**	CH1_7L
19	SHIELD	**20**	CH2_10H	**19**	CH2_10L	**20**	CH1_8H	**19**	CH1_8L
21	SHIELD	**22**	CH2_11H	**21**	CH2_11L	**22**	CH1_9H	**21**	CH1_9L
23	SHIELD	**24**	CH2_12H	**23**	CH2_12L	**24**	CH1_10L	**23**	CH1_10H
25	SHIELD	**26**	UNUSED	**25**	UNUSED	**26**	CH1_11L	**25**	CH1_11H
27	SHIELD	**28**	UNUSED	**27**	UNUSED	**28**	CH1_12L	**27**	CH1_12H
29	SHIELD	**30**	UNUSED	**29**	UNUSED	**30**	CH2_COMH	**29**	CH2_COML
31	SHIELD	**32**	GND_C	**31**	UNUSED	**32**	UNUSED	**31**	CH2_1W

TABLE 4-3: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

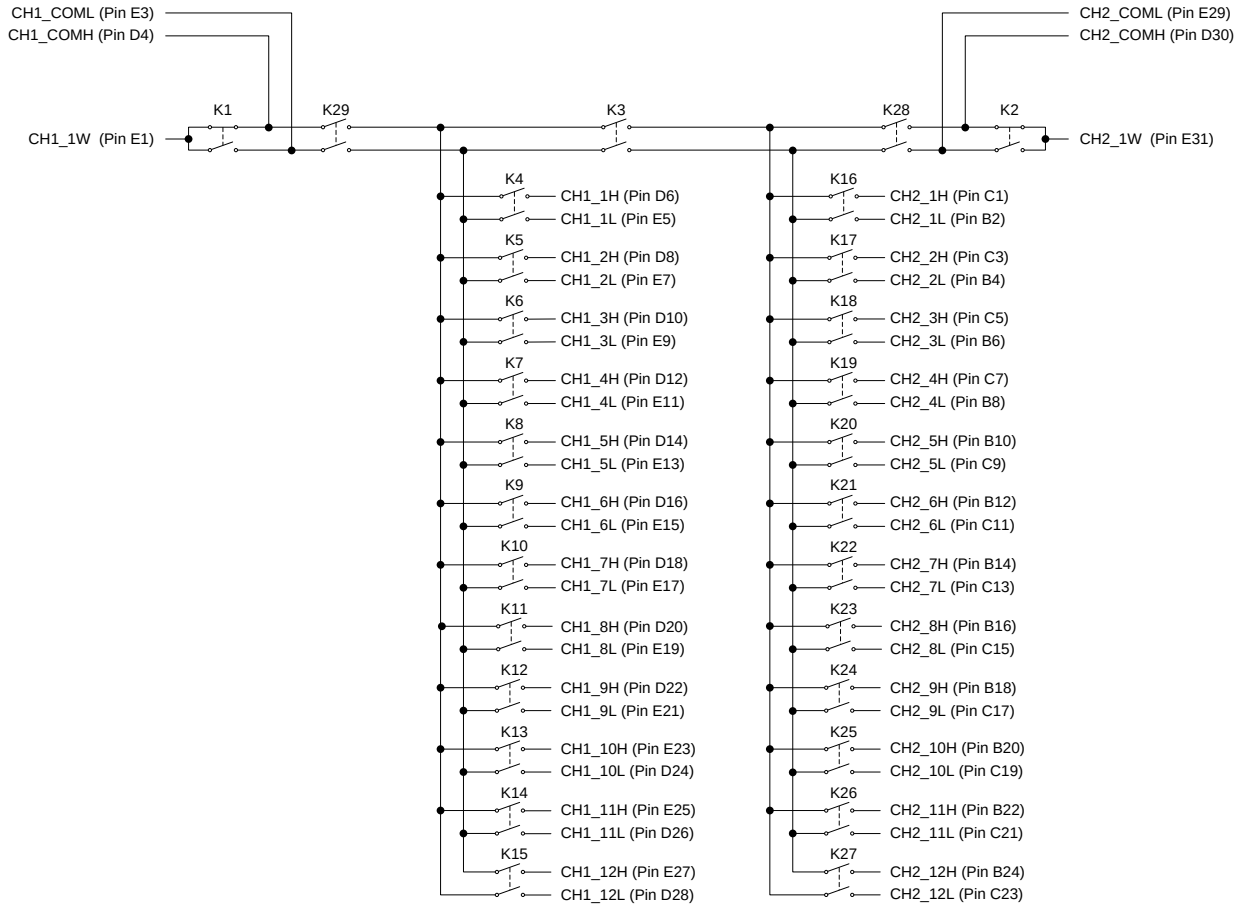


FIGURE 4-7: EX1200-2007A LOGICAL DIAGRAM

EX1200-2007A SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	(1 x 24) 2-wire, dual (1 x 12) 2-wire, or dual (1 x 24) 1-wire
RELAY TYPE	
	Reed
MAXIMUM SWITCHING VOLTAGE	
	1000 V dc / 700 V ac rms
MAXIMUM SWITCHING CURRENT	
	1 A
MAXIMUM CARRY CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	25 W (resistive load)
RATED SWITCH OPERATIONS	
Mechanical	1×10^8
Electrical	1×10^6 (full load)
SWITCHING TIME	
	< 1 ms
PATH RESISTANCE	
	< 1 Ω
INSULATION RESISTANCE	
	> 1×10^7 Ω
BANDWIDTH (-3 dB)	
	65 MHz (typical)

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

Application Note

The EX1200-2007A is intended to be used as a multiplexer only and not as a splitter (i.e. split a single input signal into multiple paths). Use of the EX1200-2007A as a splitter may cause damage to its circuitry.

EX1200-2008H PLUG-IN MODULE

30-CHANNEL 3 (1 X 10) HIGH-VOLTAGE MULTIPLEXER

The EX1200-2008H high-voltage, 1 A single-pole, single-throw relay multiplexer with three banks containing ten channels each. All relays are independently controllable. It is the highest density module in its class capable of switching signals to 1000 V. The EX1200-2008 can be mixed and matched with other EX1200 series plug-in modules in a single mainframe to construct a flexible mixed-signal switching subsystem.

The EX1200-2008H has been designed for applications requiring high-voltage signal switching. When switching high voltages, the need for signal shielding becomes critical. This module has been designed to include large shield planes to reduce crosstalk and voltage spikes to adjacent channels.

CONNECTOR PINS AND SIGNALS

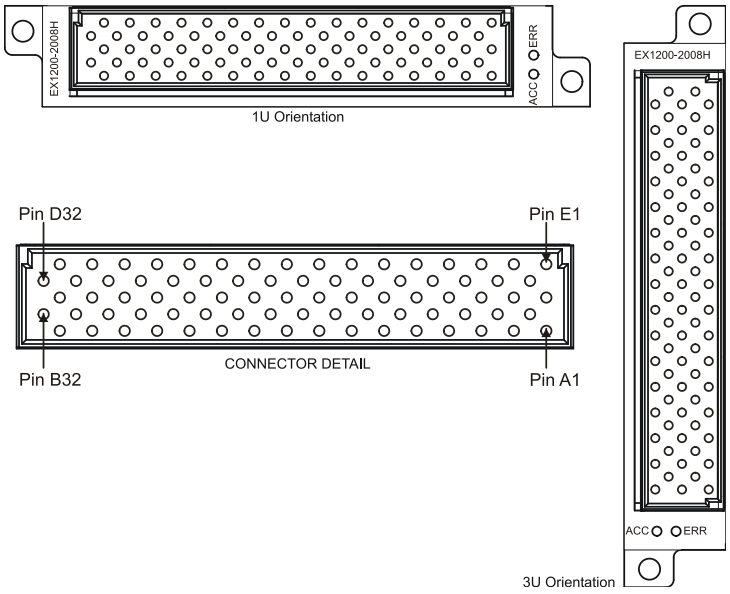


FIGURE 4-8: EX1200-2008H FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	SHIELD	**2**	CH1_1	**1**	CH1_2	**2**	UNUSED	**1**	CH1_COM
3	SHIELD	**4**	CH1_3	**3**	CH1_4	**4**	UNUSED	**3**	SHIELD
5	SHIELD	**6**	CH1_5	**5**	CH1_6	**6**	UNUSED	**5**	SHIELD
7	SHIELD	**8**	CH1_7	**7**	CH1_8	**8**	UNUSED	**7**	SHIELD
9	SHIELD	**10**	CH1_9	**9**	CH1_10	**10**	UNUSED	**9**	SHIELD
11	SHIELD	**12**	CH2_1	**11**	CH2_2	**12**	UNUSED	**11**	CH2_COM
13	SHIELD	**14**	CH2_3	**13**	CH2_4	**14**	UNUSED	**13**	SHIELD
15	SHIELD	**16**	CH2_5	**15**	CH2_6	**16**	UNUSED	**15**	SHIELD
17	SHIELD	**18**	CH2_7	**17**	CH2_8	**18**	UNUSED	**17**	SHIELD
19	SHIELD	**20**	CH2_9	**19**	CH2_10	**20**	UNUSED	**19**	SHIELD
21	SHIELD	**22**	UNUSED	**21**	UNUSED	**22**	UNUSED	**21**	SHIELD
23	SHIELD	**24**	CH3_1	**23**	CH3_2	**24**	UNUSED	**23**	CH3_COM
25	SHIELD	**26**	CH3_3	**25**	CH3_4	**26**	UNUSED	**25**	SHIELD
27	SHIELD	**28**	CH3_5	**27**	CH3_6	**28**	UNUSED	**27**	SHIELD
29	FP_OPEN	**30**	CH3_7	**29**	CH3_8	**30**	UNUSED	**29**	SHIELD
31	FP_GND	**32**	CH3_9	**31**	CH3_10	**32**	UNUSED	**31**	SHIELD

TABLE 4-4: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

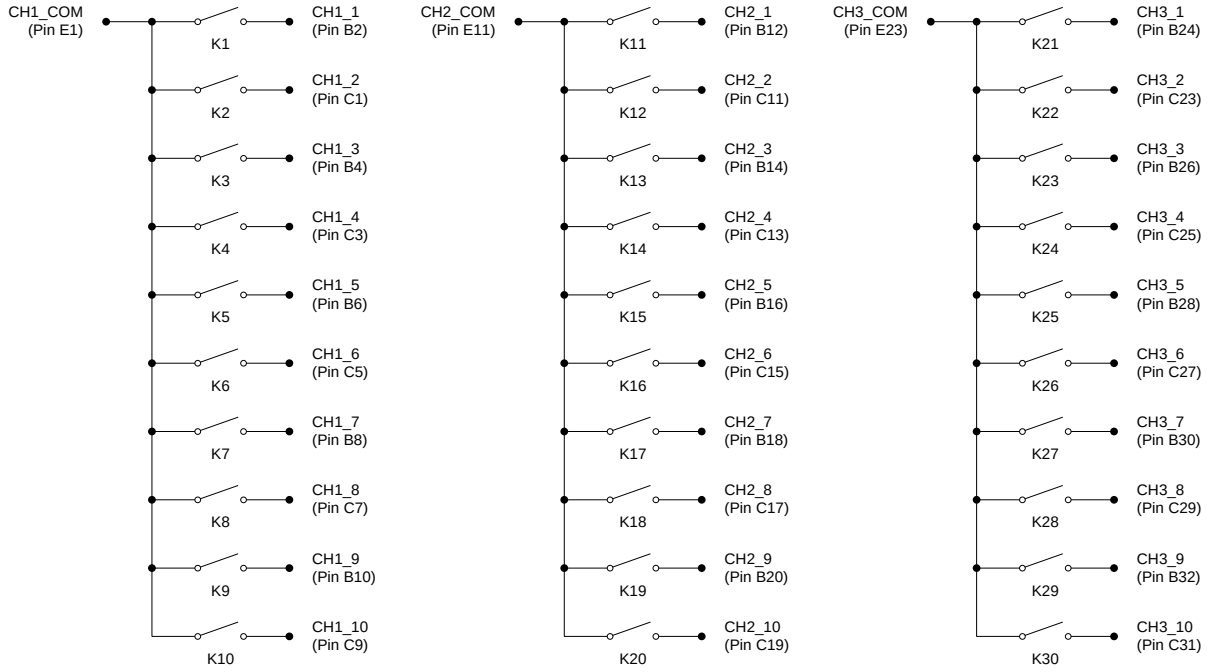


FIGURE 4-9: EX1200-2008H LOGICAL DIAGRAM

EX1200-2008H SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Three (1 x 10) single-wire channels
RELAY TYPE	
	High-voltage reed relays
MAXIMUM SWITCHING VOLTAGE	
	1000 V dc
MAXIMUM SWITCHING CURRENT	
	1 A
MAXIMUM CARRY CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	25 W dc (resistive load)
MINIMUM CONTACT RATING*	
	5 V dc, 0.1 A
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	100×10^6
Electrical	1×10^6 (full load)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 0.5 Ω
INSULATION RESISTANCE	
	$> 1 \times 10^7$ Ω
BANDWIDTH (-3 dB)	
	55 MHz (typical)

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3001 PLUG-IN MODULE

1 X 64 2-WIRE MULTIPLEXER

The EX1200-3001 high-density multiplexer module is designed for scanning of multiple points to a common bus, in either 1-, 2-, or 4-wire configurations, either synchronously with the EX1200 system DMM scan function, or asynchronously as a system switch to other devices through LXI LAN messages or the hardware trigger bus. Up to 384 two-wire (or 192 four-wire) channels can be accommodated in a 1U EX1200 mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Applications include cable harness testing, semiconductor and PCB testing, and applications where multiple points need to be switched to a common resource. All relays also have individual relay control, and each path allows for 2 A switching.

The EX1200-3001 consists of eight individual (1 x 8) 2-wire multiplexers, or eight (1 x 16) 1-wire multiplexers that can be interconnected under program control (via the bussing relays) to configure larger multiplexers as required. This eliminates external wiring and helps reduce unterminated stubs. The card has internal relays that can be closed to connect directly to the EX1200 analog bus. This feature allows the card and the internal EX1200 DMM to be tightly coupled, dramatically reducing test execution times. Access to the DMM also allows 4-wire measurements to be made, providing more accurate resistance measurements that compensate for lead-length.

The EX1200-3001 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-11 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. An optional terminal block provides screw termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

CONNECTOR PINS AND SIGNALS

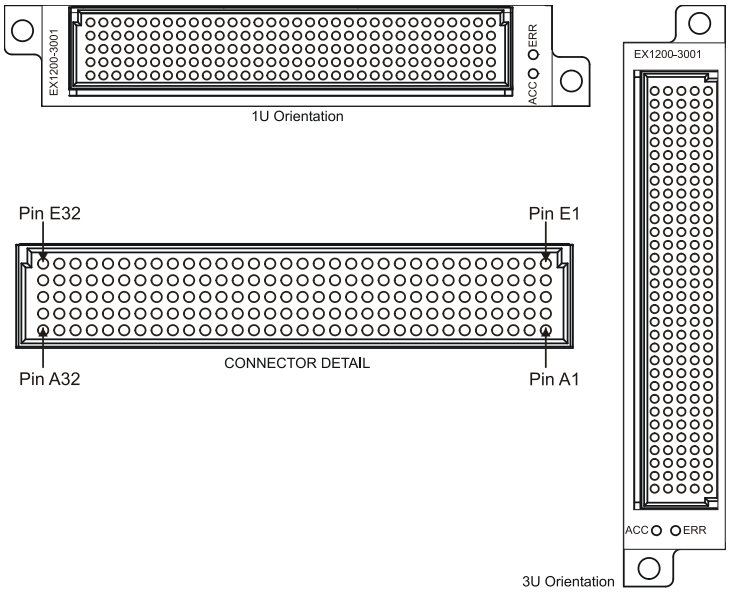


FIGURE 4-10: EX1200-3001 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH1_1W	**1**	CH1_COMH	**1**	CH1_1H	**1**	CH1_2H	**1**	CH1_3H
2	SHIELD	**2**	CH1_COML	**2**	CH1_1L	**2**	CH1_2L	**2**	CH1_3L
3	CH1_4H	**3**	CH1_5H	**3**	CH1_6H	**3**	CH1_7H	**3**	CH1_8H
4	CH1_4L	**4**	CH1_5L	**4**	CH1_6L	**4**	CH1_7L	**4**	CH1_8L
5	CH2_1W	**5**	CH2_COMH	**5**	CH2_1H	**5**	CH2_2H	**5**	CH2_3H
6	SHIELD	**6**	CH2_COML	**6**	CH2_1L	**6**	CH2_2L	**6**	CH2_3L
7	CH2_4H	**7**	CH2_5H	**7**	CH2_6H	**7**	CH2_7H	**7**	CH2_8H
8	CH2_4L	**8**	CH2_5L	**8**	CH2_6L	**8**	CH2_7L	**8**	CH2_8L
9	CH3_1W	**9**	CH3_COMH	**9**	CH3_1H	**9**	CH3_2H	**9**	CH3_3H
10	SHIELD	**10**	CH3_COML	**10**	CH3_1L	**10**	CH3_2L	**10**	CH3_3L
11	CH3_4H	**11**	CH3_5H	**11**	CH3_6H	**11**	CH3_7H	**11**	CH3_8H
12	CH3_4L	**12**	CH3_5L	**12**	CH3_6L	**12**	CH3_7L	**12**	CH3_8L
13	CH4_1W	**13**	CH4_COMH	**13**	CH4_1H	**13**	CH4_2H	**13**	CH4_3H
14	SHIELD	**14**	CH4_COML	**14**	CH4_1L	**14**	CH4_2L	**14**	CH4_3L
15	CH4_4H	**15**	CH4_5H	**15**	CH4_6H	**15**	CH4_7H	**15**	CH4_8H
16	CH4_4L	**16**	CH4_5L	**16**	CH4_6L	**16**	CH4_7L	**16**	CH4_8L
17	CH5_1W	**17**	CH5_COMH	**17**	CH5_1H	**17**	CH5_2H	**17**	CH5_3H
18	SHIELD	**18**	CH5_COML	**18**	CH5_1L	**18**	CH5_2L	**18**	CH5_3L
19	CH5_4H	**19**	CH5_5H	**19**	CH5_6H	**19**	CH5_7H	**19**	CH5_8H
20	CH5_4L	**20**	CH5_5L	**20**	CH5_6L	**20**	CH5_7L	**20**	CH5_8L
21	CH6_1W	**21**	CH6_COMH	**21**	CH6_1H	**21**	CH6_2H	**21**	CH6_3H
22	SHIELD	**22**	CH6_COML	**22**	CH6_1L	**22**	CH6_2L	**22**	CH6_3L
23	CH6_4H	**23**	CH6_5H	**23**	CH6_6H	**23**	CH6_7H	**23**	CH6_8H
24	CH6_4L	**24**	CH6_5L	**24**	CH6_6L	**24**	CH6_7L	**24**	CH6_8L
25	CH7_1W	**25**	CH7_COMH	**25**	CH7_1H	**25**	CH7_2H	**25**	CH7_3H
26	CH7_4H	**26**	CH7_COML	**26**	CH7_1L	**26**	CH7_2L	**26**	CH7_3L
27	CH7_4L	**27**	CH7_5H	**27**	CH7_6H	**27**	CH7_7H	**27**	CH7_8H
28	CH8_1W	**28**	CH7_5L	**28**	CH7_6L	**28**	CH7_7L	**28**	CH7_8L
29	CH8_COMH	**29**	CH8_1H	**29**	CH8_2H	**29**	CH8_3H	**29**	CH8_4H
30	CH8_COML	**30**	CH8_1L	**30**	CH8_2L	**30**	CH8_3L	**30**	CH8_4L
31	CH8_5H	**31**	CH8_6H	**31**	CH8_7H	**31**	CH8_8H	**31**	SHIELD
32	CH8_5L	**32**	CH8_6L	**32**	CH8_7L	**32**	CH8_8L	**32**	UNUSED

TABLE 4-5: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-3001 incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-5.

LOGICAL DIAGRAM

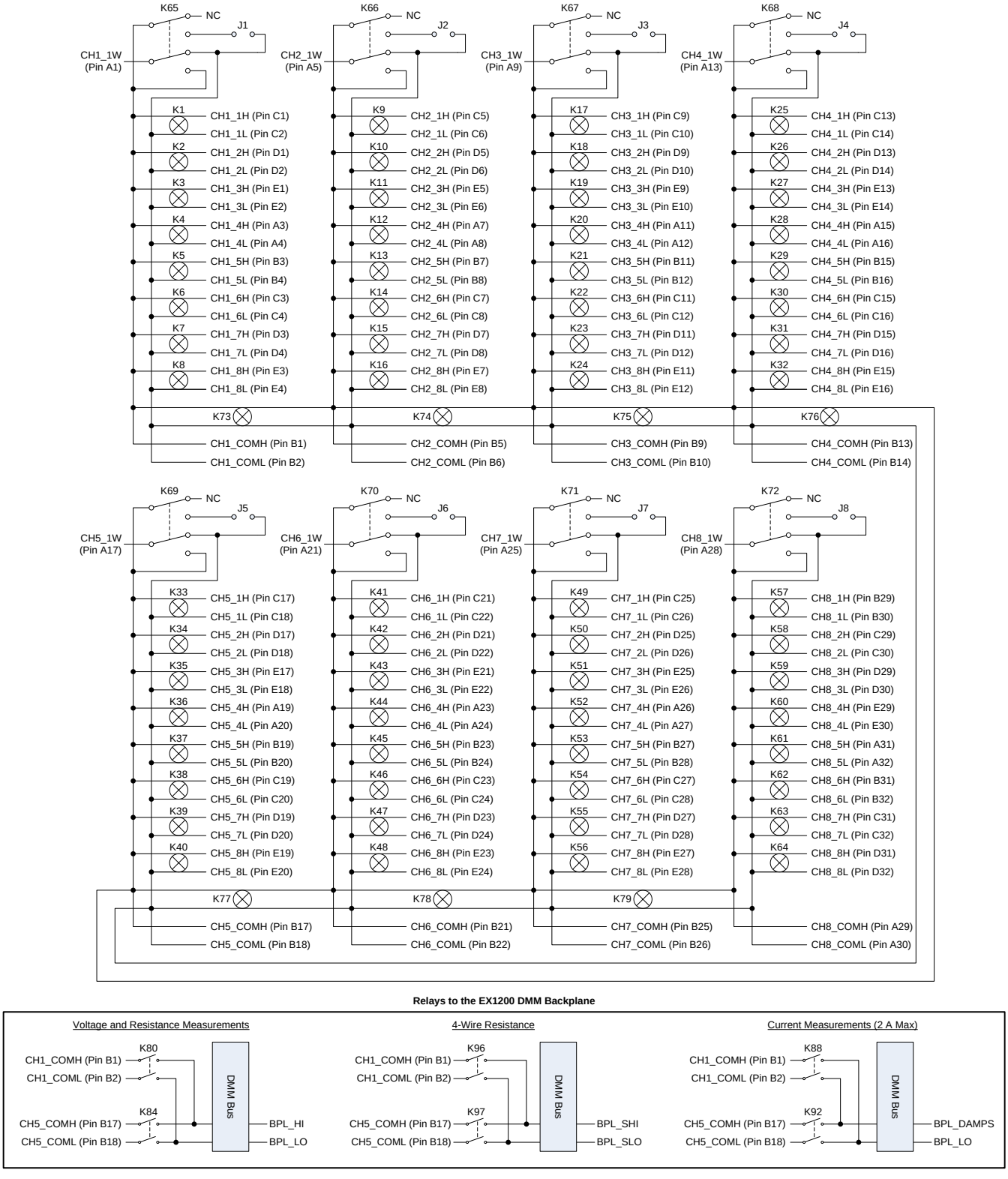


FIGURE 4-11: EX1200-3001 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH1_7L	D4	T41	CH7_7L	D28	T81	CH7_5L	B28	T121	CH6_1W	A21
T2	CH1_7H	D3	T42	CH7_7H	D27	T82	CH7_5H	B27	T122	SHIELD	A22
T3	CH2_2L	D6	T43	CH7_2L	D26	T83	CH8_1L	B30	T123	CH5_4H	A19
T4	CH2_2H	D5	T44	CH7_2H	D25	T84	CH8_1H	B29	T124	CH5_4L	A20
T5	CH2_7L	D8	T45	CH6_7L	D24	T85	CH8_6L	B32	T125	CH5_1W	A17
T6	CH2_7H	D7	T46	CH6_7H	D23	T86	CH8_6H	B31	T126	SHIELD	A18
T7	CH3_2L	D10	T47	CH6_2L	D22	T87	CH1_1L	C2	T127	CH4_4H	A15
T8	CH3_2H	D9	T48	CH6_2H	D21	T88	CH1_1H	C1	T128	CH4_4L	A16
T9	CH3_7L	D12	T49	CH5_5L	B20	T89	CH1_6L	C4	T129	CH7_8L	E28
T10	CH3_7H	D11	T50	CH5_5H	B19	T90	CH1_6H	C3	T130	CH7_8H	E27
T11	CH4_2L	D14	T51	CH1_1W	A1	T91	CH2_1L	C6	T131	CH7_3L	E26
T12	CH4_2H	D13	T52	SHIELD	A2	T92	CH2_1H	C5	T132	CH7_3H	E25
T13	CH4_7L	D16	T53	CH1_4H	A3	T93	CH2_6L	C8	T133	CH8_4L	E30
T14	CH4_7H	D15	T54	CH1_4L	A4	T94	CH2_6H	C7	T134	CH8_4H	E29
T15	CH5_2L	D18	T55	CH2_1W	A5	T95	CH3_1L	C10	T135	CH7_6L	C28
T16	CH5_2H	D17	T56	SHIELD	A6	T96	CH3_1H	C9	T136	CH7_6H	C27
T17	CH2_COML	B6	T57	CH2_4H	A7	T97	CH5_8L	E20	T137	CH8_2L	C30
T18	CH2_COMH	B5	T58	CH2_4L	A8	T98	CH5_8H	E19	T138	CH8_2H	C29
T19	CH1_5L	B4	T59	CH7_COML	B26	T99	CH4_8L	E16	T139	CH7_1H	C25
T20	CH1_5H	B3	T60	CH7_COMH	B25	T100	CH4_8H	E15	T140	CH7_1L	C26
T21	CH2_5L	B8	T61	CH6_5L	B24	T101	CH6_3L	E22	T141	CH6_6H	C23
T22	CH2_5H	B7	T62	CH6_5H	B23	T102	CH6_3H	E21	T142	CH6_6L	C24
T23	CH3_COML	B10	T63	CH6_COML	B22	T103	CH6_8L	E24	T143	CH5_1L	C18
T24	CH3_COMH	B9	T64	CH6_COMH	B21	T104	CH6_8H	E23	T144	CH5_1H	C17
T25	CH3_5L	B12	T65	CH8_3L	D30	T105	CH4_3L	E14	T145	CH6_1H	C21
T26	CH3_5H	B11	T66	CH8_3H	D29	T106	CH4_3H	E13	T146	CH6_1L	C22
T27	CH4_COML	B14	T67	CH8_8L	D32	T107	CH3_8L	E12	T147	CH5_6H	C19
T28	CH4_COMH	B13	T68	CH8_8H	D31	T108	CH3_8H	E11	T148	CH5_6L	C20
T29	CH4_5L	B16	T69	CH1_3L	E2	T109	CH3_3L	E10	T149	CH7_1W	A25
T30	CH4_5H	B15	T70	CH1_3H	E1	T110	CH3_3H	E9	T150	CH8_1W	A28
T31	CH5_COML	B18	T71	CH1_8L	E4	T111	CH2_8L	E8	T151	CH7_4H	A26
T32	CH5_COMH	B17	T72	CH1_8H	E3	T112	CH2_8H	E7	T152	CH7_4L	A27
T33	CH5_7L	D20	T73	CH2_3L	E6	T113	CH3_6L	C12	T153	CH8_COMH	A29
T34	CH5_7H	D19	T74	CH2_3H	E5	T114	CH3_6H	C11	T154	CH8_COML	A30
T35	CH3_1W	A9	T75	CH5_3H	E17	T115	CH4_1L	C14	T155	SHIELD	E31
T36	SHIELD	A10	T76	CH5_3L	E18	T116	CH4_1H	C13	T156	GND_C	E32
T37	CH3_4H	A11	T77	CH1_2L	D2	T117	CH4_6L	C16	T157	CH8_7H	C31
T38	CH3_4L	A12	T78	CH1_2H	D1	T118	CH4_6H	C15	T158	CH8_7L	C32
T39	CH4_1W	A13	T79	CH1_COML	B2	T119	CH6_4H	A23	T159	CH8_5H	A31
T40	SHIELD	A14	T80	CH1_COMH	B1	T120	CH6_4L	A24	T160	CH8_5L	A32

TABLE 4-6: EX1200-TB160-3 TERMINAL BLOCK TO EX1200-3001 PIN MAPPING

RT1 can be measured by the EX1200 DMM or may be measured using an external instrument. To use an external instrument, connect it to T164 (L_VS) and T163 (H_VS). To use a sensor other than the onboard thermistor, connect it using T162 (RL_I) and T161 (RH_I). Note that CH1_7L (T1) and CH1_7H (T2) must be dedicated to making temperature measurements once P2 is configured.

EX1200-3001 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Eight individual (1 x 8) 2-wire or eight (1 x 16) 1-wire
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V ac rms, 300 V dc
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 0.5 Ω
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	50 MHz (typical)
INSERTION LOSS	
100 kHz	< 0.1 dB
1 MHz	< 0.2 dB
10 MHz	< 0.5 dB
CROSSTALK	
100 kHz	< -90 dB
1 MHz	< -70 dB
10 MHz	< -50 dB
ISOLATION	
100 kHz	< -90 dB
1 MHz	< -70 dB
10 MHz	< -60 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3001DS PLUG-IN MODULE

1 X 64 2-WIRE MULTIPLEXER WITH DISCHARGE CIRCUIT

The EX1200-3001DS high-density multiplexer module is designed for scanning of multiple points to a common bus, in either 1-, 2-, or 4-wire configurations, either synchronously with the EX1200 system DMM scan function, or asynchronously as a system switch to other devices through LXI LAN messages or the hardware trigger bus. Up to 384 two-wire (or 192 four-wire) channels can be accommodated in a 1U EX1200 mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Applications include cable harness testing, semiconductor and PCB testing, and applications where multiple points need to be switched to a common resource. All relays also have individual relay control, and each path allows for 2 A switching.

Along with all having all the features of the EX1200-3001, the EX1200-3001DS has internal residual voltage discharge relays which can be enabled to momentarily short out the measurement path when changing from one input channel to the next. This dissipates any voltage held by the wiring and instrument input capacitance. These relays protect sensitive devices, such as CMOS circuits, from residual voltages caused by previous high-voltage measurements. This feature can also be disabled in low-voltage applications where maximum throughput speed is important.

The EX1200-3001DS can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-13 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. An optional terminal block provides screw termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

CONNECTOR PINS AND SIGNALS

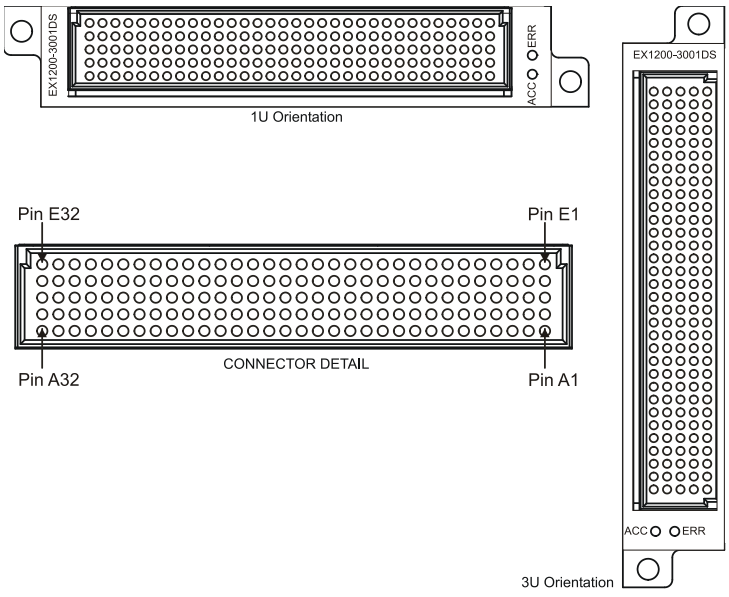


FIGURE 4-12: EX1200-3001DS FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH1_1W	**1**	CH1_COMH	**1**	CH1_1H	**1**	CH1_2H	**1**	CH1_3H
2	SHIELD	**2**	CH1_COML	**2**	CH1_1L	**2**	CH1_2L	**2**	CH1_3L
3	CH1_4H	**3**	CH1_5H	**3**	CH1_6H	**3**	CH1_7H	**3**	CH1_8H
4	CH1_4L	**4**	CH1_5L	**4**	CH1_6L	**4**	CH1_7L	**4**	CH1_8L
5	CH2_1W	**5**	CH2_COMH	**5**	CH2_1H	**5**	CH2_2H	**5**	CH2_3H
6	SHIELD	**6**	CH2_COML	**6**	CH2_1L	**6**	CH2_2L	**6**	CH2_3L
7	CH2_4H	**7**	CH2_5H	**7**	CH2_6H	**7**	CH2_7H	**7**	CH2_8H
8	CH2_4L	**8**	CH2_5L	**8**	CH2_6L	**8**	CH2_7L	**8**	CH2_8L
9	CH3_1W	**9**	CH3_COMH	**9**	CH3_1H	**9**	CH3_2H	**9**	CH3_3H
10	SHIELD	**10**	CH3_COML	**10**	CH3_1L	**10**	CH3_2L	**10**	CH3_3L
11	CH3_4H	**11**	CH3_5H	**11**	CH3_6H	**11**	CH3_7H	**11**	CH3_8H
12	CH3_4L	**12**	CH3_5L	**12**	CH3_6L	**12**	CH3_7L	**12**	CH3_8L
13	CH4_1W	**13**	CH4_COMH	**13**	CH4_1H	**13**	CH4_2H	**13**	CH4_3H
14	SHIELD	**14**	CH4_COML	**14**	CH4_1L	**14**	CH4_2L	**14**	CH4_3L
15	CH4_4H	**15**	CH4_5H	**15**	CH4_6H	**15**	CH4_7H	**15**	CH4_8H
16	CH4_4L	**16**	CH4_5L	**16**	CH4_6L	**16**	CH4_7L	**16**	CH4_8L
17	CH5_1W	**17**	CH5_COMH	**17**	CH5_1H	**17**	CH5_2H	**17**	CH5_3H
18	SHIELD	**18**	CH5_COML	**18**	CH5_1L	**18**	CH5_2L	**18**	CH5_3L
19	CH5_4H	**19**	CH5_5H	**19**	CH5_6H	**19**	CH5_7H	**19**	CH5_8H
20	CH5_4L	**20**	CH5_5L	**20**	CH5_6L	**20**	CH5_7L	**20**	CH5_8L
21	CH6_1W	**21**	CH6_COMH	**21**	CH6_1H	**21**	CH6_2H	**21**	CH6_3H
22	SHIELD	**22**	CH6_COML	**22**	CH6_1L	**22**	CH6_2L	**22**	CH6_3L
23	CH6_4H	**23**	CH6_5H	**23**	CH6_6H	**23**	CH6_7H	**23**	CH6_8H
24	CH6_4L	**24**	CH6_5L	**24**	CH6_6L	**24**	CH6_7L	**24**	CH6_8L
25	CH7_1W	**25**	CH7_COMH	**25**	CH7_1H	**25**	CH7_2H	**25**	CH7_3H
26	CH7_4H	**26**	CH7_COML	**26**	CH7_1L	**26**	CH7_2L	**26**	CH7_3L
27	CH7_4L	**27**	CH7_5H	**27**	CH7_6H	**27**	CH7_7H	**27**	CH7_8H
28	CH8_1W	**28**	CH7_5L	**28**	CH7_6L	**28**	CH7_7L	**28**	CH7_8L
29	CH8_COMH	**29**	CH8_1H	**29**	CH8_2H	**29**	CH8_3H	**29**	CH8_4H
30	CH8_COML	**30**	CH8_1L	**30**	CH8_2L	**30**	CH8_3L	**30**	CH8_4L
31	CH8_5H	**31**	CH8_6H	**31**	CH8_7H	**31**	CH8_8H	**31**	SHIELD
32	CH8_5L	**32**	CH8_6L	**32**	CH8_7L	**32**	CH8_8L	**32**	UNUSED

TABLE 4-7: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-3001DS incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-7.

LOGICAL DIAGRAM

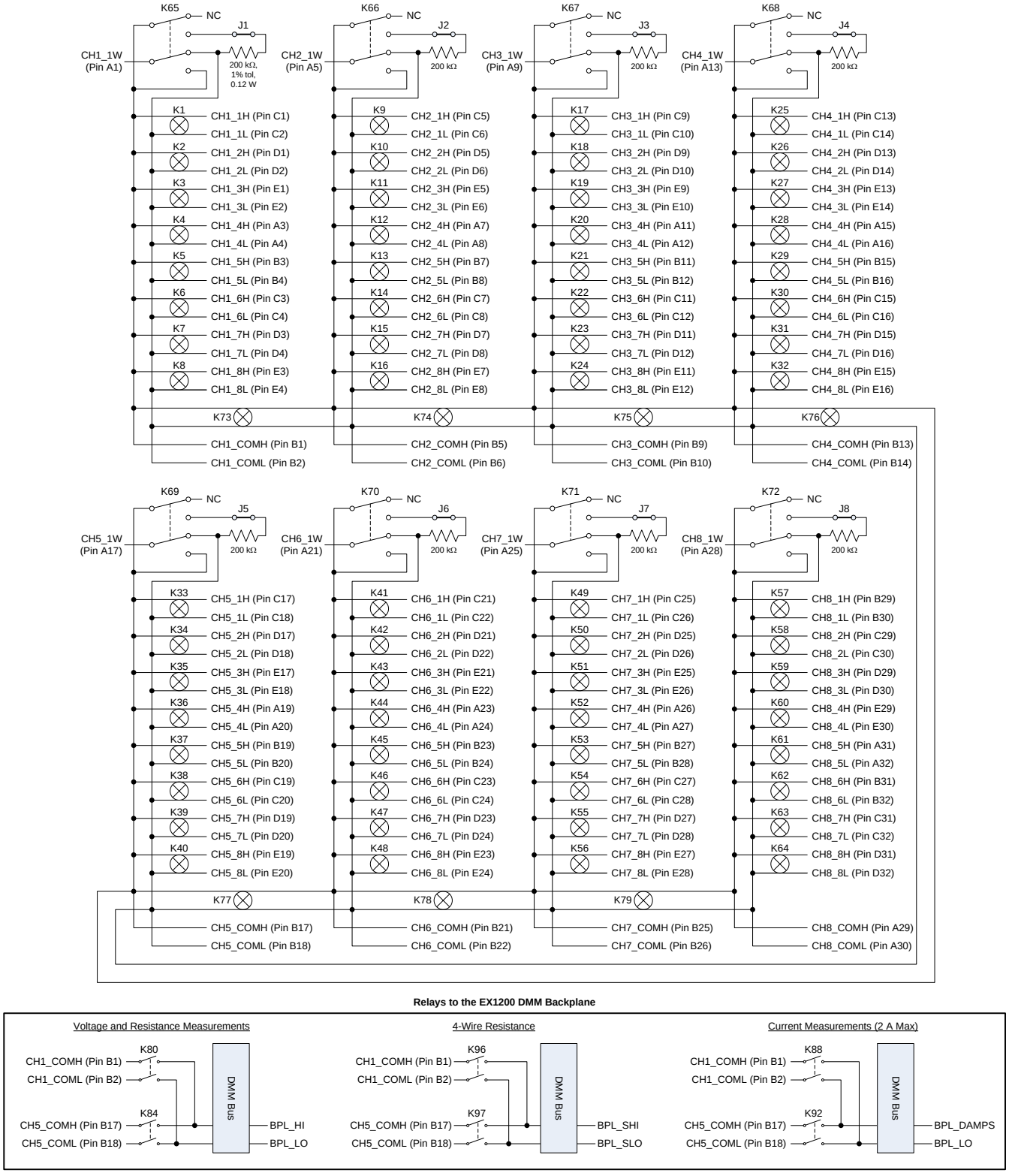


FIGURE 4-13: EX1200-3001DS LOGICAL DIAGRAM

EX1200-3001DS SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Eight individual (1 x 8) 2-wire or eight (1 x 16) 1-wire
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V ac rms, 300V dc
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 0.5 Ω
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	50 MHz (typical)
INSERTION LOSS	
100 kHz	< 0.1 dB
1 MHz	< 0.2 dB
10 MHz	< 0.5 dB
CROSSTALK	
100 kHz	< -90 dB
1 MHz	< -70 dB
10 MHz	< -50 dB
ISOLATION	
100 kHz	< -90 dB
1 MHz	< -70 dB
10 MHz	< -60 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3048 PLUG-IN MODULE

48-CHANNEL 300 V/ 2 A MULTIPLEXER

EX1200-3048 high-density multiplexer modules are designed for scanning multiple points to a common bus in either 2- or 4-wire configurations, either synchronously, with the EX1200 system DMM scan function, or asynchronously, as a system switch to other devices through LXI LAN messages or the hardware trigger bus. Up to 288 two-wire (or 144 four-wire) channels can be accommodated in a 1U EX1200 mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Applications include cable harness testing, semiconductor and PCB testing, and in applications where multiple points need to be switched to a common resource. All relays have individual control and each path allows for hot switching of up to 300 V and 2 A (60 W dc max). The EX1200-3048 also has the capability to directly measure up to 2 A.

The EX1200-3048 consists of dual (1 x 24) 2-wire multiplexer banks. Each bank can be interconnected within a module under program control (via bussing relays) and across modules via the EX1200 analog bus to configure larger multiplexers as required. This eliminates external wiring and helps reduce unterminated stubs. The EX1200-3048 has internal residual voltage discharge relays which can be enabled to momentarily short out the measurement path when changing from one input channel to the next. This dissipates any voltage held by the wiring and instrument input capacitance. These relays protect sensitive devices, such as CMOS circuits, from residual voltages caused by previous high-voltage measurements. This feature can also be disabled in low-voltage applications where maximum throughput speed is important.

The EX1200-3048 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-15 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. An optional terminal block provides screw termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

CONNECTOR PINS AND SIGNALS

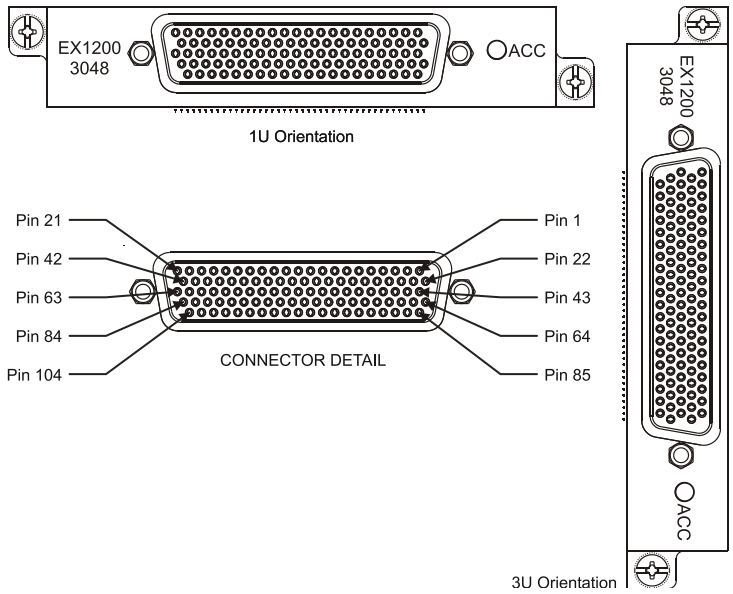


FIGURE 4-14: EX1200-3048 FRONT PANEL (FRONT VIEW)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	CH1_1L	**22**	CH1_5L	**43**	CH1_10L	**64**	CH1_15L	**85**	CH1_20L
2	CH1_1H	**23**	CH1_5H	**44**	CH1_10H	**65**	CH1_15H	**86**	CH1_20H
3	CH1_2L	**24**	CH1_6L	**45**	CH1_11L	**66**	CH1_16L	**87**	CH1_21L
4	CH1_2H	**25**	CH1_6H	**46**	CH1_11H	**67**	CH1_16H	**88**	CH1_21H
5	CH1_COML	**26**	CH1_7L	**47**	CH1_12L	**68**	CH1_17L	**89**	CH1_22L
6	CH1_COMH	**27**	CH1_7H	**48**	CH1_12H	**69**	CH1_17H	**90**	CH1_22H
7	CH1_3L	**28**	CH1_8L	**49**	CH1_13L	**70**	CH1_18L	**91**	CH1_23L
8	CH1_3H	**29**	CH1_8H	**50**	CH1_13H	**71**	CH1_18H	**92**	CH1_23H
9	CH1_4L	**30**	CH1_9L	**51**	CH1_14L	**72**	CH1_19L	**93**	CH1_24L
10	CH1_4H	**31**	CH1_9H	**52**	CH1_14H	**73**	CH1_19H	**94**	CH1_24H
11	CH2_1L	**32**	CH2_5L	**53**	CH2_10L	**74**	CH2_15L	**95**	CH2_20L
12	CH2_1H	**33**	CH2_5H	**54**	CH2_10H	**75**	CH2_15H	**96**	CH2_20H
13	CH2_2L	**34**	CH2_6L	**55**	CH2_11L	**76**	CH2_16L	**97**	CH2_21L
14	CH2_2H	**35**	CH2_6H	**56**	CH2_11H	**77**	CH2_16H	**98**	CH2_21H
15	CH2_COML	**36**	CH2_7L	**57**	CH2_12L	**78**	CH2_17L	**99**	CH2_22L
16	CH2_COMH	**37**	CH2_7H	**58**	CH2_12H	**79**	CH2_17H	**100**	CH2_22H
17	CH2_3L	**38**	CH2_8L	**59**	CH2_13L	**80**	CH2_18L	**101**	CH2_23L
18	CH2_3H	**39**	CH2_8H	**60**	CH2_13H	**81**	CH2_18H	**102**	CH2_23H
19	CH2_4L	**40**	CH2_9L	**61**	CH2_14L	**82**	CH2_19L	**103**	CH2_24L
20	CH2_4H	**41**	CH2_9H	**62**	CH2_14H	**83**	CH2_19H	**104**	CH2_24H
21	CH3_1I	**42**	CH3_1L	**63**	CH3_2I	**84**	CH3_2L		

TABLE 4-8: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

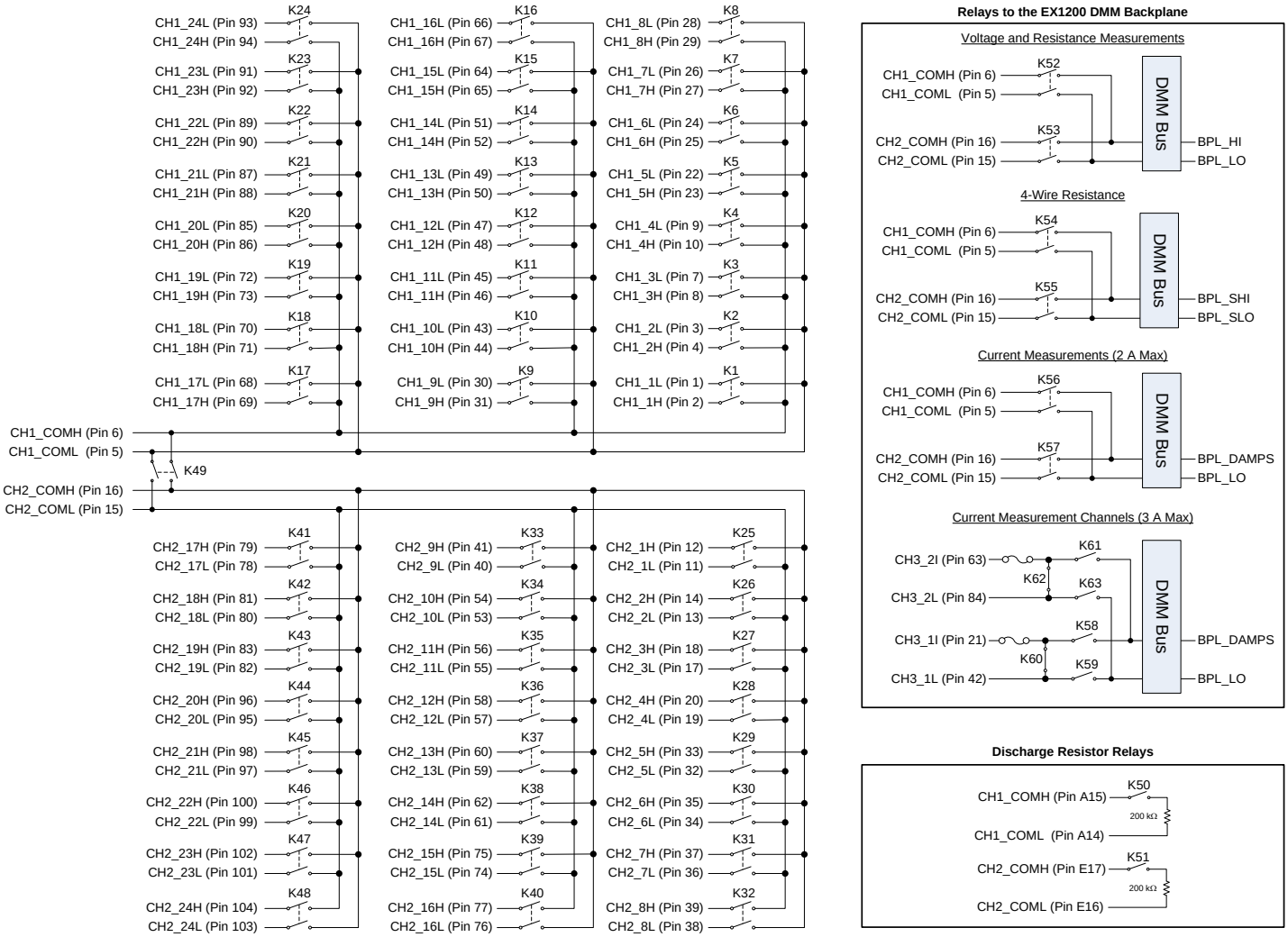


FIGURE 4-15: EX1200-3048 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH1_1L	1	T31	CH1_9L	30	T61	CH2_13L	59	T91	CH2_19L	82
T2	CH1_1H	2	T32	CH1_9H	31	T62	CH2_13H	60	T92	CH2_19H	83
T3	CH1_2L	3	T33	CH2_5L	32	T63	CH2_14L	61	T93	UNUSED	N/A
T4	CH1_2H	4	T34	CH2_5H	33	T64	CH2_14H	62	T94	CH3_2L	84
T5	CH1_COML	5	T35	CH2_6L	34	T65	UNUSED	N/A	T95	CH1_20L	85
T6	CH1_COMH	6	T36	CH2_6H	35	T66	CH3_2I	63	T96	CH1_20H	86
T7	CH1_3L	7	T37	CH2_7L	36	T67	CH1_15L	64	T97	CH1_21L	87
T8	CH1_3H	8	T38	CH2_7H	37	T68	CH1_15H	65	T98	CH1_21H	88
T9	CH1_4L	9	T39	CH2_8L	38	T69	CH1_16L	66	T99	CH1_22L	89
T10	CH1_4H	10	T40	CH2_8H	39	T70	CH1_16H	67	T100	CH1_22H	90
T11	CH2_1L	11	T41	CH2_9L	40	T71	CH1_17L	68	T101	CH1_23L	91
T12	CH2_1H	12	T42	CH2_9H	41	T72	CH1_17H	69	T102	CH1_23H	92
T13	CH2_2L	13	T43	UNUSED	N/A	T73	CH1_18L	70	T103	CH1_24L	93
T14	CH2_2H	14	T44	CH3_1L	42	T74	CH1_18H	71	T104	CH1_24H	94
T15	CH2_COML	15	T45	CH1_10L	43	T75	UNUSED	N/A	T105	CH2_20L	95
T16	CH2_COMH	16	T46	CH1_10H	44	T76	UNUSED	N/A	T106	CH2_20H	96
T17	CH2_3L	17	T47	CH1_11L	45	T77	UNUSED	N/A	T107	CH2_21L	97
T18	CH2_3H	18	T48	CH1_11H	46	T78	UNUSED	N/A	T108	CH2_21H	98
T19	CH2_4L	19	T49	CH1_12L	47	T79	UNUSED	N/A	T109	CH2_22L	99
T20	CH2_4H	20	T50	CH1_12H	48	T80	UNUSED	N/A	T110	CH2_22H	100
T21	UNUSED	N/A	T51	CH1_13L	49	T81	CH1_19L	72	T111	CH2_23L	101
T22	CH3_1I	21	T52	CH1_13H	50	T82	CH1_19H	73	T112	CH2_23H	102
T23	CH1_5L	22	T53	CH1_14L	51	T83	CH2_15L	74	T113	CH2_24L	103
T24	CH1_5H	23	T54	CH1_14H	52	T84	CH2_15H	75	T114	CH2_24H	104
T25	CH1_6L	24	T55	CH2_10L	53	T85	CH2_16L	76	T115	UNUSED	N/A
T26	CH1_6H	25	T56	CH2_10H	54	T86	CH2_16H	77	T116	UNUSED	N/A
T27	CH1_7L	26	T57	CH2_11L	55	T87	CH2_17L	78	T117	UNUSED	N/A
T28	CH1_7H	27	T58	CH2_11H	56	T88	CH2_17H	79	T118	UNUSED	N/A
T29	CH1_8L	28	T59	CH2_12L	57	T89	CH2_18L	80	T119	UNUSED	N/A
T30	CH1_8H	29	T60	CH2_12H	58	T90	CH2_18H	81	T120	UNUSED	N/A

TABLE 4-10: EX1200-TB104 TERMINAL BLOCK TO EX1200-3048 PIN MAPPING

RT1 can be measured by the EX1200 DMM or may be measured using an external instrument. If an external sensor is used, it must be connected to T163 (L_VS) and T164 (H_VS). The user may also choose to use a sensor other than the on-board thermistor. To do so, connect the sensor using T161 (RL_I) and T162 (RH_I). Note that CH1_1L (T1) and CH1_1H (T2) must be dedicated to making temperature measurements once P2 is configured.

EX1200-3048 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	48 two-wire or 24 four-wire
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V dc, 300 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER*	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 0.5 Ω
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	35 MHz (typical)
CROSSTALK	
100 kHz	< -55 dB
1 MHz	< -45 dB
10 MHz	< -30 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3048S PLUG-IN MODULE

48-CHANNEL TWO-WIRE FET MULTIPLEXER

The EX1200-3048S is a high-density FET multiplexer module designed for scanning of multiple points to a common bus, in either 2- or 4-wire configurations, either synchronously with the EX1200 system DMM scan function, or asynchronously as a system switch to other devices through LXI LAN messages or the hardware trigger bus. The solid-state design delivers maximum switching speed and near infinite life. Up to 288 two-wire (or 144 four-wire) channels can be accommodated in a 1U EX1200 full rack mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Typical applications include temperature and voltage data acquisition and data logging at up to 1000 scans per second.

The EX1200-3048S consists of dual (1x24) 2-wire multiplexer banks. Each bank can be interconnected within a module under program control (via bussing relays) and across modules via the EX1200 analog bus to configure larger multiplexers as required. This eliminates external wiring and helps reduce unterminated stubs. Internal residual voltage discharge relays can be enabled to momentarily short out the measurement path when changing from one input channel to the next. This dissipates any voltage held by the wiring and instrument input capacitance. These relays protect sensitive devices, such as CMOS circuits, from residual voltages caused by previous high-voltage measurements. This feature can also be disabled in low-voltage applications where maximum throughput speed is important.

The EX1200-3048S can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-17 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. An optional terminal block provides screw termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

CONNECTOR PINS AND SIGNALS

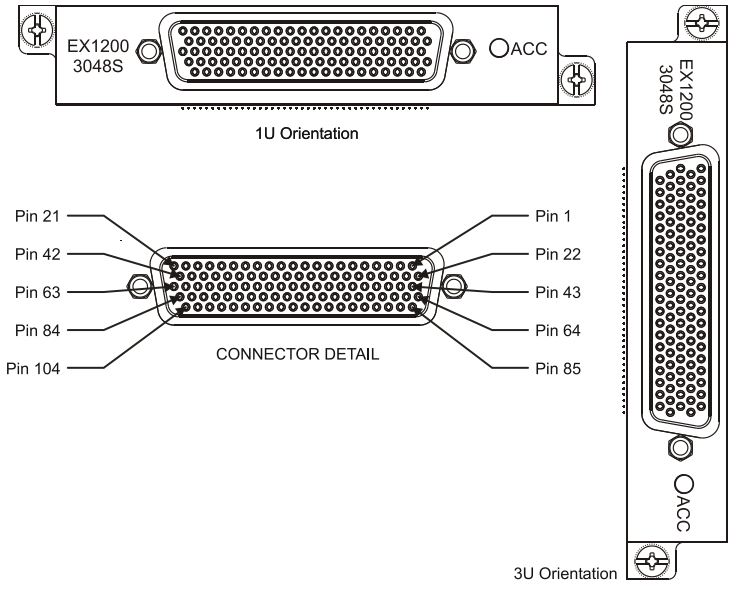


FIGURE 4-16: EX1200-3048S FRONT PANEL (FRONT VIEW)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	CH1_1L	22	CH1_5L	43	CH1_10L	64	CH1_15L	85	CH1_20L
2	CH1_1H	23	CH1_5H	44	CH1_10H	65	CH1_15H	86	CH1_20H
3	CH1_2L	24	CH1_6L	45	CH1_11L	66	CH1_16L	87	CH1_21L
4	CH1_2H	25	CH1_6H	46	CH1_11H	67	CH1_16H	88	CH1_21H
5	CH1_COML	26	CH1_7L	47	CH1_12L	68	CH1_17L	89	CH1_22L
6	CH1_COMH	27	CH1_7H	48	CH1_12H	69	CH1_17H	90	CH1_22H
7	CH1_3L	28	CH1_8L	49	CH1_13L	70	CH1_18L	91	CH1_23L
8	CH1_3H	29	CH1_8H	50	CH1_13H	71	CH1_18H	92	CH1_23H
9	CH1_4L	30	CH1_9L	51	CH1_14L	72	CH1_19L	93	CH1_24L
10	CH1_4H	31	CH1_9H	52	CH1_14H	73	CH1_19H	94	CH1_24H
11	CH2_1L	32	CH2_5L	53	CH2_10L	74	CH2_15L	95	CH2_20L
12	CH2_1H	33	CH2_5H	54	CH2_10H	75	CH2_15H	96	CH2_20H
13	CH2_2L	34	CH2_6L	55	CH2_11L	76	CH2_16L	97	CH2_21L
14	CH2_2H	35	CH2_6H	56	CH2_11H	77	CH2_16H	98	CH2_21H
15	CH2_COML	36	CH2_7L	57	CH2_12L	78	CH2_17L	99	CH2_22L
16	CH2_COMH	37	CH2_7H	58	CH2_12H	79	CH2_17H	100	CH2_22H
17	CH2_3L	38	CH2_8L	59	CH2_13L	80	CH2_18L	101	CH2_23L
18	CH2_3H	39	CH2_8H	60	CH2_13H	81	CH2_18H	102	CH2_23H
19	CH2_4L	40	CH2_9L	61	CH2_14L	82	CH2_19L	103	CH2_24L
20	CH2_4H	41	CH2_9H	62	CH2_14H	83	CH2_19H	104	CH2_24H
21	SHIELD	42	SHIELD	63	GND_C	84	GND_C		

TABLE 4-11: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-3048S incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. . To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-11.

The module also incorporates ground pins, labeled "GND_C" above. These pins tie the module to chassis ground. Note that the SHIELD pins are not tied to ground and have no electrical connections.

LOGICAL DIAGRAM

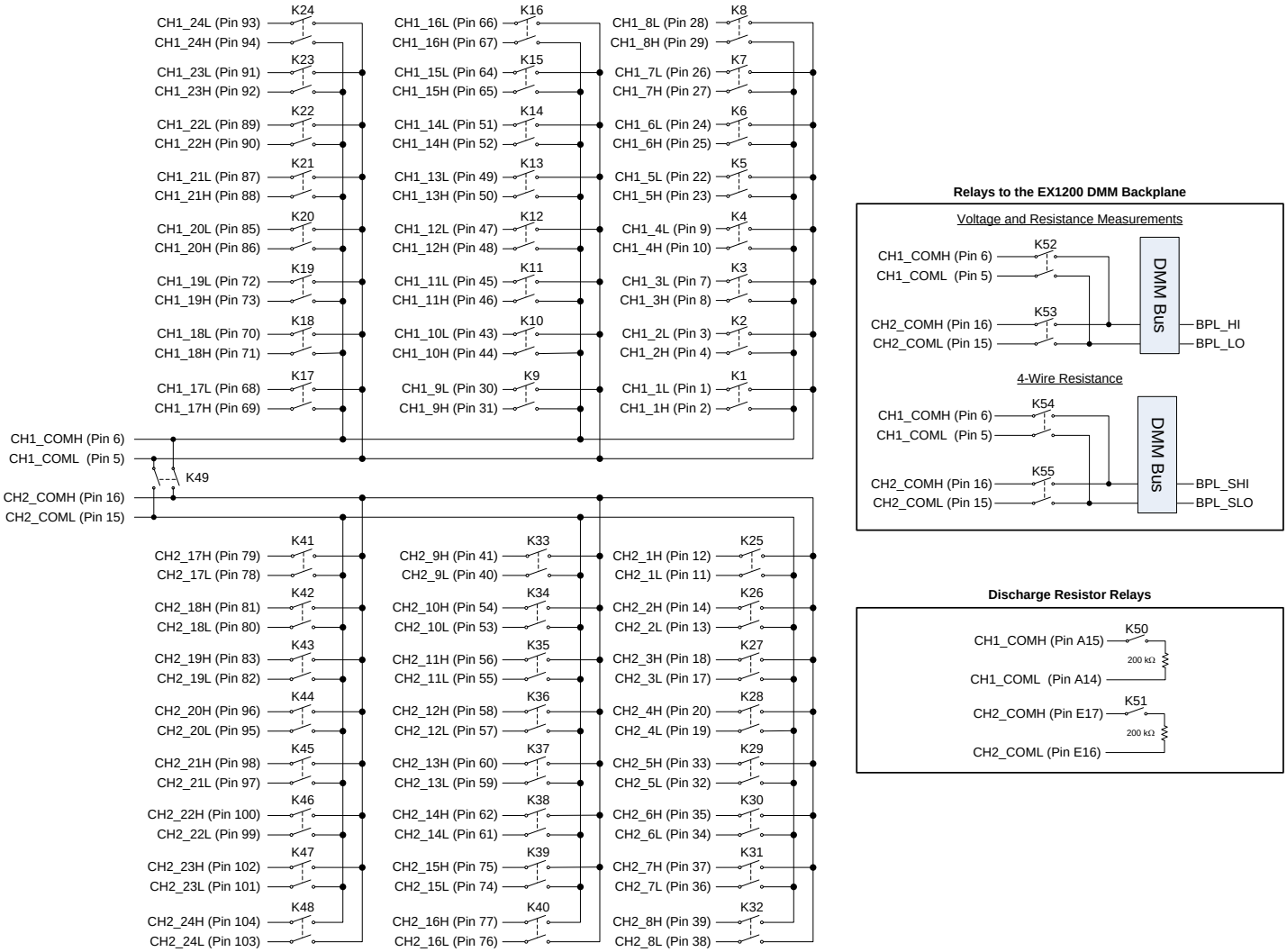


FIGURE 4-17: EX1200-3048S LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH1_1L	1	T31	CH1_9L	30	T61	CH2_13L	59	T91	CH2_19L	82
T2	CH1_1H	2	T32	CH1_9H	31	T62	CH2_13H	60	T92	CH2_19H	83
T3	CH1_2L	3	T33	CH2_5L	32	T63	CH2_14L	61	T93	UNUSED	N/A
T4	CH1_2H	4	T34	CH2_5H	33	T64	CH2_14H	62	T94	SHIELD	84
T5	CH1_COML	5	T35	CH2_6L	34	T65	UNUSED	N/A	T95	CH1_20L	85
T6	CH1_COMH	6	T36	CH2_6H	35	T66	SHIELD	63	T96	CH1_20H	86
T7	CH1_3L	7	T37	CH2_7L	36	T67	CH1_15L	64	T97	CH1_21L	87
T8	CH1_3H	8	T38	CH2_7H	37	T68	CH1_15H	65	T98	CH1_21H	88
T9	CH1_4L	9	T39	CH2_8L	38	T69	CH1_16L	66	T99	CH1_22L	89
T10	CH1_4H	10	T40	CH2_8H	39	T70	CH1_16H	67	T100	CH1_22H	90
T11	CH2_1L	11	T41	CH2_9L	40	T71	CH1_17L	68	T101	CH1_23L	91
T12	CH2_1H	12	T42	CH2_9H	41	T72	CH1_17H	69	T102	CH1_23H	92
T13	CH2_2L	13	T43	UNUSED	N/A	T73	CH1_18L	70	T103	CH1_24L	93
T14	CH2_2H	14	T44	SHIELD	42	T74	CH1_18H	71	T104	CH1_24H	94
T15	CH2_COML	15	T45	CH1_10L	43	T75	UNUSED	N/A	T105	CH2_20L	95
T16	CH2_COMH	16	T46	CH1_10H	44	T76	UNUSED	N/A	T106	CH2_20H	96
T17	CH2_3L	17	T47	CH1_11L	45	T77	UNUSED	N/A	T107	CH2_21L	97
T18	CH2_3H	18	T48	CH1_11H	46	T78	UNUSED	N/A	T108	CH2_21H	98
T19	CH2_4L	19	T49	CH1_12L	47	T79	UNUSED	N/A	T109	CH2_22L	99
T20	CH2_4H	20	T50	CH1_12H	48	T80	UNUSED	N/A	T110	CH2_22H	100
T21	UNUSED	N/A	T51	CH1_13L	49	T81	CH1_19L	72	T111	CH2_23L	101
T22	SHIELD	21	T52	CH1_13H	50	T82	CH1_19H	73	T112	CH2_23H	102
T23	CH1_5L	22	T53	CH1_14L	51	T83	CH2_15L	74	T113	CH2_24L	103
T24	CH1_5H	23	T54	CH1_14H	52	T84	CH2_15H	75	T114	CH2_24H	104
T25	CH1_6L	24	T55	CH2_10L	53	T85	CH2_16L	76	T115	UNUSED	N/A
T26	CH1_6H	25	T56	CH2_10H	54	T86	CH2_16H	77	T116	UNUSED	N/A
T27	CH1_7L	26	T57	CH2_11L	55	T87	CH2_17L	78	T117	UNUSED	N/A
T28	CH1_7H	27	T58	CH2_11H	56	T88	CH2_17H	79	T118	UNUSED	N/A
T29	CH1_8L	28	T59	CH2_12L	57	T89	CH2_18L	80	T119	UNUSED	N/A
T30	CH1_8H	29	T60	CH2_12H	58	T90	CH2_18H	81	T120	UNUSED	N/A

TABLE 4-13: EX1200-TB104 TERMINAL BLOCK TO EX1200-3048S PIN MAPPING

RT1 can be measured by the EX1200 DMM or may be measured using an external instrument. If an external sensor is used, it must be connected to T163 (L_VS) and T164 (H_VS). The user may also choose to use a sensor other than the on-board thermistor. To do so, connect the sensor using T161 (RL_I) and T162 (RH_I). Note that CH1_1L (T1) and CH1_1H (T2) must be dedicated to making temperature measurements once P2 is configured.

EX1200-3048S SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	48 two-wire or 24 four-wire
RELAY TYPE	
	Opto-isolated solid-state
MAXIMUM SWITCHING VOLTAGE	
	250 V
MAXIMUM SWITCHING CURRENT	
	0.2 A
MAXIMUM SWITCHING POWER	
	6 W/4.2 VA
RATED SWITCH OPERATIONS	
	Unlimited (solid state relays)
SWITCHING TIME	
	< 500 µs
PATH RESISTANCE	
	< 8 Ω
INSULATION RESISTANCE	
	> 1 x 10^9 Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 7 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	10 MHz (typical)
CROSSTALK (TYPICAL)	
100 kHz	< -55 dB
1 MHz	< -45 dB
10 MHz	< -30 dB
ISOLATION (TYPICAL)	
100 kHz	< -55 dB
1 MHz	< -40 dB
10 MHz	< -25 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

Application Note

Solid-state relays are not ideally suited for low-level resistance measurements (< 1 Ω). The relays have an internal resistance of approximately 13 mV which is significant under these circumstances. A leakage current is also present in solid-state relays which varies dramatically with temperature, affecting low-level resistance measurements.

EX1200-3072 PLUG-IN MODULE

72-CHANNEL 300 V/ 2 A MULTIPLEXER

The EX1200-3072 high-density multiplexer modules are designed for scanning of multiple points to a common bus, in either 2- or 4-wire configurations, either synchronously with the EX1200 system DMM scan function, or asynchronously as a system switch to other devices through LXI LAN messages or the hardware trigger bus. Up to 432 two-wire (or 216 four-wire) channels can be accommodated in a 1U EX1200 full rack mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Applications include cable harness testing, semiconductor and PCB testing, and those in which multiple points need to be switched to a common resource. All relays also have individual control, and each path allows for hot switching of up to 300 V and 2 A (60 W dc max).

The EX1200-3072 consists of dual (1 x 36) multiplexer banks. Each bank can be interconnected within a module under program control (via bussing relays) and across modules via the EX1200 analog bus to configure larger multiplexers as required. This eliminates external wiring and helps reduce unterminated stubs. It also has internal residual voltage discharge relays which can be enabled to momentarily short out the measurement path when changing from one input channel to the next. This dissipates any voltage held by the wiring and instrument input capacitance. These relays protect sensitive devices, such as CMOS circuits, from residual voltages caused by previous high-voltage measurements. This feature can also be disabled in low-voltage applications where maximum throughput speed is important.

The EX1200-3072 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-19 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available. An optional terminal block provides locking-slide termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

CONNECTOR PINS AND SIGNALS

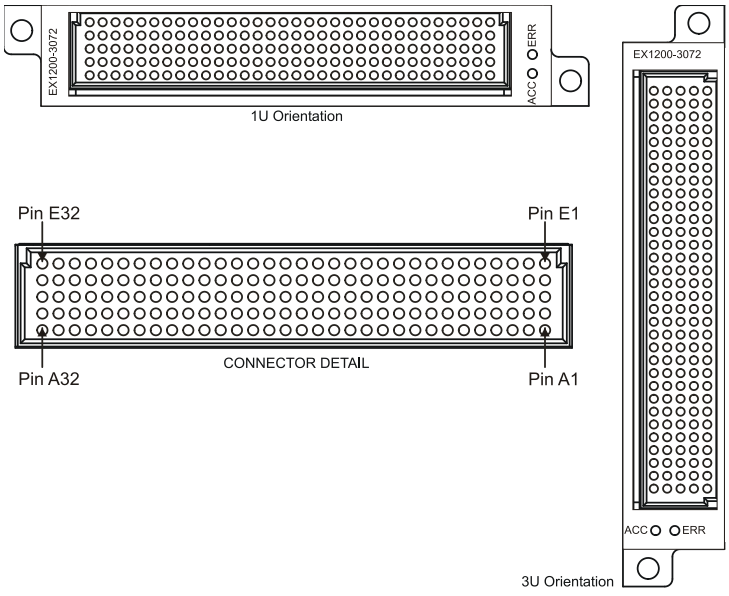


FIGURE 4-18: EX1200-3072 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	UNUSED	**1**	SHIELD	**1**	SHIELD	**1**	SHIELD	**1**	SHIELD
2	CH1_3L	**2**	CH1_4L	**2**	CH1_8L	**2**	CH1_7L	**2**	CH1_1L
3	CH1_3H	**3**	CH1_4H	**3**	CH1_8H	**3**	CH1_7H	**3**	CH1_1H
4	CH1_5L	**4**	CH1_6L	**4**	CH1_2L	**4**	CH1_9L	**4**	CH1_11L
5	CH1_5H	**5**	CH1_6H	**5**	CH1_2H	**5**	CH1_9H	**5**	CH1_11H
6	CH1_10L	**6**	CH1_15L	**6**	CH1_13L	**6**	CH1_17L	**6**	CH1_18L
7	CH1_10H	**7**	CH1_15H	**7**	CH1_13H	**7**	CH1_17H	**7**	CH1_18H
8	CH1_14L	**8**	CH1_26L	**8**	CH1_12L	**8**	CH1_27L	**8**	CH1_16L
9	CH1_14H	**9**	CH1_26H	**9**	CH1_12H	**9**	CH1_27H	**9**	CH1_16H
10	CH1_24L	**10**	CH1_19L	**10**	CH1_21L	**10**	CH1_25L	**10**	CH1_22L
11	CH1_24H	**11**	CH1_19H	**11**	CH1_21H	**11**	CH1_25H	**11**	CH1_22H
12	CH1_36L	**12**	CH1_20L	**12**	CH1_30L	**12**	CH1_23L	**12**	CH1_31L
13	CH1_36H	**13**	CH1_20H	**13**	CH1_30H	**13**	CH1_23H	**13**	CH1_31H
14	CH1_COML	**14**	CH1_28L	**14**	CH1_29L	**14**	CH1_35L	**14**	CH1_34L
15	CH1_COMH	**15**	CH1_28H	**15**	CH1_29H	**15**	CH1_35H	**15**	CH1_34H
16	CH1_33L	**16**	CH1_32L	**16**	CH2_5L	**16**	CH2_4L	**16**	CH2_COML
17	CH1_33H	**17**	CH1_32H	**17**	CH2_5H	**17**	CH2_4H	**17**	CH2_COMH
18	CH2_1L	**18**	CH2_8L	**18**	CH2_3L	**18**	CH2_2L	**18**	CH2_9L
19	CH2_1H	**19**	CH2_8H	**19**	CH2_3H	**19**	CH2_2H	**19**	CH2_9H
20	CH2_7L	**20**	CH2_14L	**20**	CH2_13L	**20**	CH2_6L	**20**	SHIELD
21	CH2_7H	**21**	CH2_14H	**21**	CH2_13H	**21**	CH2_6H	**21**	SHIELD
22	CH2_11L	**22**	CH2_12L	**22**	CH2_17L	**22**	CH2_10L	**22**	CH2_18L
23	CH2_11H	**23**	CH2_12H	**23**	CH2_17H	**23**	CH2_10H	**23**	CH2_18H
24	CH2_23L	**24**	CH2_16L	**24**	CH2_15L	**24**	CH2_19L	**24**	CH2_22L
25	CH2_23H	**25**	CH2_16H	**25**	CH2_15H	**25**	CH2_19H	**25**	CH2_22H
26	CH2_27L	**26**	CH2_20L	**26**	CH2_26L	**26**	CH2_29L	**26**	CH2_21L
27	CH2_27H	**27**	CH2_20H	**27**	CH2_26H	**27**	CH2_29H	**27**	CH2_21H
28	CH2_30L	**28**	CH2_25L	**28**	CH2_34L	**28**	CH2_24L	**28**	CH2_32L
29	CH2_30H	**29**	CH2_25H	**29**	CH2_34H	**29**	CH2_24H	**29**	CH2_32H
30	CH2_31L	**30**	CH2_33L	**30**	CH2_28L	**30**	CH2_36L	**30**	CH2_35L
31	CH2_31H	**31**	CH2_33H	**31**	CH2_28H	**31**	CH2_36H	**31**	CH2_35H
32	UNUSED	**32**	SHIELD	**32**	SHIELD	**32**	SHIELD	**32**	SHIELD

TABLE 4-14: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-3072 incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-14.

LOGICAL DIAGRAM

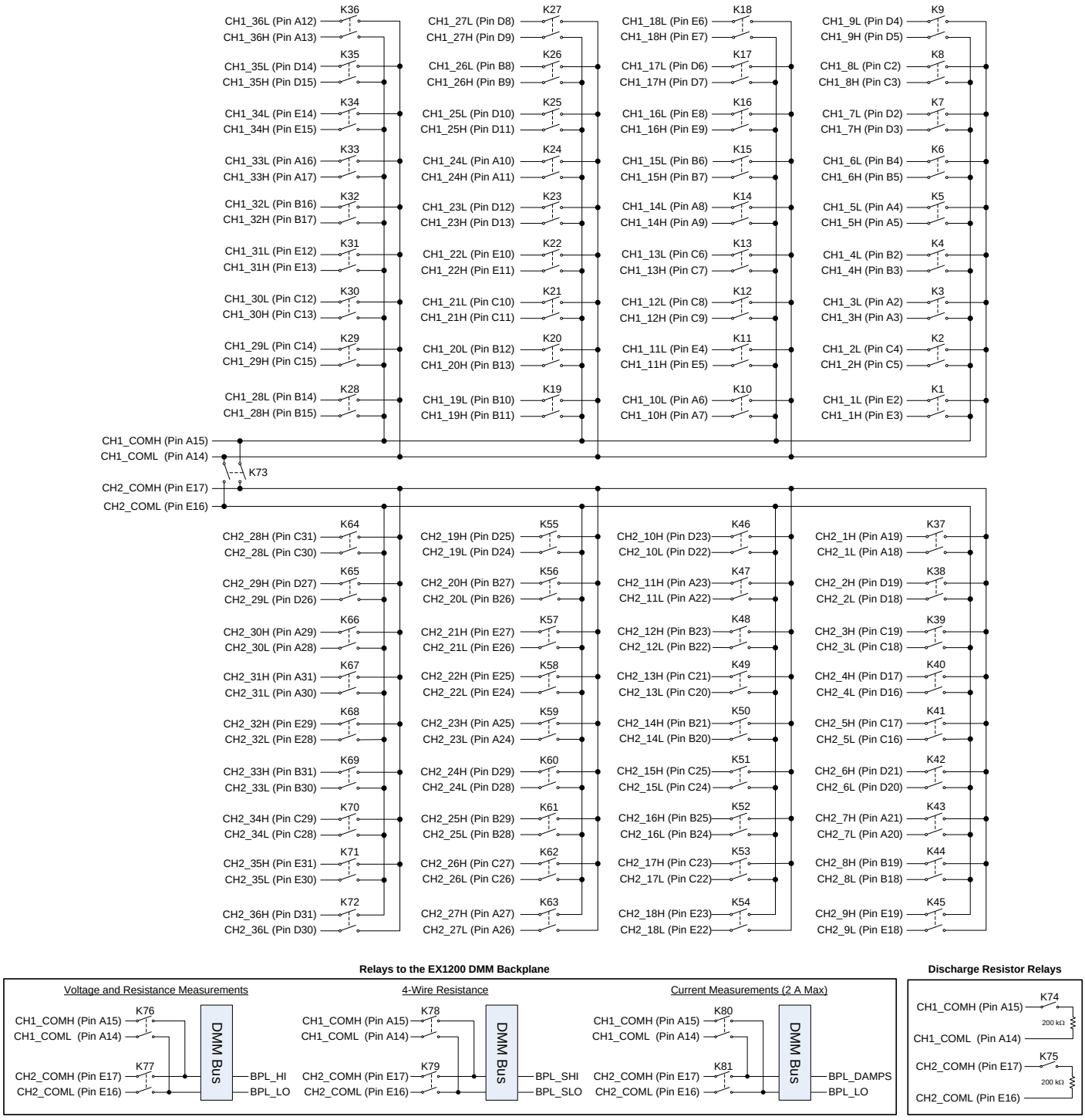

K36 CH1_36L (Pin A12) CH1_36H (Pin A13)
K35 CH1_35L (Pin D14) CH1_35H (Pin D15)
K34 CH1_34L (Pin E14) CH1_34H (Pin E15)
K33 CH1_33L (Pin A16) CH1_33H (Pin A17)
K32 CH1_32L (Pin B16) CH1_32H (Pin B17)
K31 CH1_31L (Pin E12) CH1_31H (Pin E13)
K30 CH1_30L (Pin C12) CH1_30H (Pin C13)
K29 CH1_29L (Pin C14) CH1_29H (Pin C15)
K28 CH1_28L (Pin B14) CH1_28H (Pin B15)
K27 CH1_27L (Pin D8) CH1_27H (Pin D9)
K26 CH1_26L (Pin B8) CH1_26H (Pin B9)
K25 CH1_25L (Pin D10) CH1_25H (Pin D11)
K24 CH1_24L (Pin A10) CH1_24H (Pin A11)
K23 CH1_23L (Pin D12) CH1_23H (Pin D13)
K22 CH1_22L (Pin E10) CH1_22H (Pin E11)
K21 CH1_21L (Pin C10) CH1_21H (Pin C11)
K20 CH1_20L (Pin B12) CH1_20H (Pin B13)
K19 CH1_19L (Pin B10) CH1_19H (Pin B11)
K18 CH1_18L (Pin E6) CH1_18H (Pin E7)
K17 CH1_17L (Pin D6) CH1_17H (Pin D7)
K16 CH1_16L (Pin E8) CH1_16H (Pin E9)
K15 CH1_15L (Pin B6) CH1_15H (Pin B7)
K14 CH1_14L (Pin A8) CH1_14H (Pin A9)
K13 CH1_13L (Pin C6) CH1_13H (Pin C7)
K12 CH1_12L (Pin C8) CH1_12H (Pin C9)
K11 CH1_11L (Pin E4) CH1_11H (Pin E5)
K10 CH1_10L (Pin A6) CH1_10H (Pin A7)
K9 CH1_9L (Pin D4) CH1_9H (Pin D5)
K8 CH1_8L (Pin C2) CH1_8H (Pin C3)
K7 CH1_7L (Pin D2) CH1_7H (Pin D3)
K6 CH1_6L (Pin B4) CH1_6H (Pin B5)
K5 CH1_5L (Pin A4) CH1_5H (Pin A5)
K4 CH1_4L (Pin B2) CH1_4H (Pin B3)
K3 CH1_3L (Pin A2) CH1_3H (Pin A3)
K2 CH1_2L (Pin C4) CH1_2H (Pin C5)
K1 CH1_1L (Pin E2) CH1_1H (Pin E3)
CH1_COMH (Pin A15)
CH1_COML (Pin A14)
K73
CH2_COMH (Pin E17)
CH2_COML (Pin E16)
K64 CH2_28H (Pin C31) CH2_28L (Pin C30)
K65 CH2_29H (Pin D27) CH2_29L (Pin D26)
K66 CH2_30H (Pin A29) CH2_30L (Pin A28)
K67 CH2_31H (Pin A31) CH2_31L (Pin A30)
K68 CH2_32H (Pin E29) CH2_32L (Pin E28)
K69 CH2_33H (Pin B31) CH2_33L (Pin B30)
K70 CH2_34H (Pin C29) CH2_34L (Pin C28)
K71 CH2_35H (Pin E31) CH2_35L (Pin E30)
K72 CH2_36H (Pin D31) CH2_36L (Pin D30)
K55 CH2_19H (Pin D25) CH2_19L (Pin D24)
K56 CH2_20H (Pin B27) CH2_20L (Pin B26)
K57 CH2_21H (Pin E27) CH2_21L (Pin E26)
K58 CH2_22H (Pin E25) CH2_22L (Pin E24)
K59 CH2_23H (Pin A25) CH2_23L (Pin A24)
K60 CH2_24H (Pin D29) CH2_24L (Pin D28)
K61 CH2_25H (Pin B29) CH2_25L (Pin B28)
K62 CH2_26H (Pin C27) CH2_26L (Pin C26)
K63 CH2_27H (Pin A27) CH2_27L (Pin A26)
K46 CH2_10H (Pin D23) CH2_10L (Pin D22)
K47 CH2_11H (Pin A23) CH2_11L (Pin A22)
K48 CH2_12H (Pin B23) CH2_12L (Pin B22)
K49 CH2_13H (Pin C21) CH2_13L (Pin C20)
K50 CH2_14H (Pin B21) CH2_14L (Pin B20)
K51 CH2_15H (Pin C25) CH2_15L (Pin C24)
K52 CH2_16H (Pin B25) CH2_16L (Pin B24)
K53 CH2_17H (Pin C23) CH2_17L (Pin C22)
K54 CH2_18H (Pin E23) CH2_18L (Pin E22)
K37 CH2_1H (Pin A19) CH2_1L (Pin A18)
K38 CH2_2H (Pin D19) CH2_2L (Pin D18)
K39 CH2_3H (Pin C19) CH2_3L (Pin C18)
K40 CH2_4H (Pin D17) CH2_4L (Pin D16)
K41 CH2_5H (Pin C17) CH2_5L (Pin C16)
K42 CH2_6H (Pin D21) CH2_6L (Pin D20)
K43 CH2_7H (Pin A21) CH2_7L (Pin A20)
K44 CH2_8H (Pin B19) CH2_8L (Pin B18)
K45 CH2_9H (Pin E19) CH2_9L (Pin E18)
Relays to the EX1200 DMM Backplane
Voltage and Resistance Measurements
K76 CH1_COMH (Pin A15) CH1_COML (Pin A14)
K77 CH2_COMH (Pin E17) CH2_COML (Pin E16)
DMM Bus
BPL_HI BPL_LO
4-Wire Resistance
K78 CH1_COMH (Pin A15) CH1_COML (Pin A14)
K79 CH2_COMH (Pin E17) CH2_COML (Pin E16)
DMM Bus
BPL_SHI BPL_SLO
Current Measurements (2 A Max)
K80 CH1_COMH (Pin A15) CH1_COML (Pin A14)
K81 CH2_COMH (Pin E17) CH2_COML (Pin E16)
DMM Bus
BPL_DAMPS BPL_LO
Discharge Resistor Relays
K74 CH1_COMH (Pin A15) 200 kΩ CH1_COML (Pin A14)
K75 CH2_COMH (Pin E17) 200 kΩ CH2_COML (Pin E16)

FIGURE 4-19: EX1200-3072 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH1_1L	E2	T41	CH1_21L	C10	T81	CH2_1L	A18	T121	CH2_21L	E26
T2	CH1_1H	E3	T42	CH1_21H	C11	T82	CH2_1H	A19	T122	CH2_21H	E27
T3	CH1_2L	C4	T43	CH1_22L	E10	T83	CH2_2L	D18	T123	CH2_22L	E24
T4	CH1_2H	C5	T44	CH1_22H	E11	T84	CH2_2H	D19	T124	CH2_22H	E25
T5	CH1_3L	A2	T45	CH1_23L	D12	T85	CH2_3L	C18	T125	CH2_23L	A24
T6	CH1_3H	A3	T46	CH1_23H	D13	T86	CH2_3H	C19	T126	CH2_23H	A25
T7	CH1_4L	B2	T47	CH1_24L	A10	T87	CH2_4L	D16	T127	CH2_24L	D28
T8	CH1_4H	B3	T48	CH1_24H	A11	T88	CH2_4H	D17	T128	CH2_24H	D29
T9	CH1_5L	A4	T49	CH1_25L	D10	T89	CH2_5L	C16	T129	CH2_25L	B28
T10	CH1_5H	A5	T50	CH1_25H	D11	T90	CH2_5H	C17	T130	CH2_25H	B29
T11	CH1_6L	B4	T51	CH1_26L	B8	T91	CH2_6L	D20	T131	CH2_26L	C26
T12	CH1_6H	B5	T52	CH1_26H	B9	T92	CH2_6H	D21	T132	CH2_26H	C27
T13	CH1_7L	D2	T53	CH1_27L	D8	T93	CH2_7L	A20	T133	CH2_27L	A26
T14	CH1_7H	D3	T54	CH1_27H	D9	T94	CH2_7H	A21	T134	CH2_27H	A27
T15	CH1_8L	C2	T55	CH1_28L	B14	T95	CH2_8L	B18	T135	CH2_28L	C30
T16	CH1_8H	C3	T56	CH1_28H	B15	T96	CH2_8H	B19	T136	CH2_28H	C31
T17	CH1_9L	D4	T57	CH1_29L	C14	T97	CH2_9L	E18	T137	CH2_29L	D26
T18	CH1_9H	D5	T58	CH1_29H	C15	T98	CH2_9H	E19	T138	CH2_29H	D27
T19	CH1_10L	A6	T59	CH1_30L	C12	T99	CH2_10L	D22	T139	CH2_30L	A28
T20	CH1_10H	A7	T60	CH1_30H	C13	T100	CH2_10H	D23	T140	CH2_30H	A29
T21	CH1_11L	E4	T61	CH1_31L	E12	T101	CH2_11L	A22	T141	CH2_31L	A30
T22	CH1_11H	E5	T62	CH1_31H	E13	T102	CH2_11H	A23	T142	CH2_31H	A31
T23	CH1_12L	C8	T63	CH1_32L	B16	T103	CH2_12L	B22	T143	CH2_32L	E28
T24	CH1_12H	C9	T64	CH1_32H	B17	T104	CH2_12H	B23	T144	CH2_32H	E29
T25	CH1_13L	C6	T65	CH1_33L	A16	T105	CH2_13L	C20	T145	CH2_33L	B30
T26	CH1_13H	C7	T66	CH1_33H	A17	T106	CH2_13H	C21	T146	CH2_33H	B31
T27	CH1_14L	A8	T67	CH1_34L	E14	T107	CH2_14L	B20	T147	CH2_34L	C28
T28	CH1_14H	A9	T68	CH1_34H	E15	T108	CH2_14H	B21	T148	CH2_34H	C29
T29	CH1_15L	B6	T69	CH1_35L	D14	T109	CH2_15L	C24	T149	CH2_35L	E30
T30	CH1_15H	B7	T70	CH1_35H	D15	T110	CH2_15H	C25	T150	CH2_35H	E31
T31	CH1_16L	E8	T71	CH1_36L	A12	T111	CH2_16L	B24	T151	CH2_36L	D30
T32	CH1_16H	E9	T72	CH1_36H	A13	T112	CH2_16H	B25	T152	CH2_36H	D31
T33	CH1_17L	D6	T73	CH1_COML	A14	T113	CH2_17L	C22	T153	CH2_COML	E16
T34	CH1_17H	D7	T74	CH1_COMH	A15	T114	CH2_17H	C23	T154	CH2_COMH	E17
T35	CH1_18L	E6	T75	SHIELD	E20	T115	CH2_18L	E22	T155	SHIELD	D32
T36	CH1_18H	E7	T76	SHIELD	E21	T116	CH2_18H	E23	T156	SHIELD	E32
T37	CH1_19L	B10	T77	SHIELD	E1	T117	CH2_19L	D24	T157	SHIELD	B32
T38	CH1_19H	B11	T78	SHIELD	D1	T118	CH2_19H	D25	T158	SHIELD	C32
T39	CH1_20L	B12	T79	SHIELD	C1	T119	CH2_20L	B26	T159	GND_C	A1
T40	CH1_20H	B13	T80	SHIELD	B1	T120	CH2_20H	B27	T160	GND_C	A32

TABLE 4-16: EX1200-TB160-1 TERMINAL BLOCK TO EX1200-3072 PIN MAPPING

RT1 can be measured by the EX1200 DMM or may be measured using an external instrument. If an external sensor is used, it must be connected to T164 (L_VS) and T163 (H_VS). The user may also choose to use a sensor other than the on-board thermistor. To do so, connect the sensor using T162 (RL_I) and T161 (RH_I). Note that CH1_1L (T1) and CH1_1H (T2) must be dedicated to making temperature measurements once P2 is configured.

EX1200-3072 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	(1 x 72) 2-wire, dual (1 x 36) 2-wire, or (1 x 36) 4-wire
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V ac rms, 300 V dc
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 500 mΩ
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 3 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	40 MHz (typical)
CROSSTALK (TYPICAL)	
1 MHz	< -70 dB
10 MHz	< -50 dB
ISOLATION (TYPICAL)	
1 MHz	< -55 dB
10 MHz	< -35 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3096 PLUG-IN MODULE

96-CHANNEL 100 V / 0.5 A TWO-WIRE MULTIPLEXER

The EX1200-3096 high-density multiplexer modules are designed for scanning of multiple points to a common bus, in either 2- or 4-wire configurations, either synchronously with the EX1200 system DMM scan function, or asynchronously as a system switch to other devices through LXI LAN messages or the hardware trigger bus. Up to 576 two-wire (or 288 four-wire) channels can be accommodated in a 1U EX1200full-rack mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Applications include cable harness testing, semiconductor, and PCB testing, and those in which multiple points need to be switched to a common resource. All relays also have individual control, and each path allows for hot switching of up to 100 V and 1 A (30 W dc max).

The EX1200-3096 consists of dual (1x48) 2-wire multiplexer banks. Each bank can be interconnected within a module under program control (via bussing relays) and across modules via the EX1200 analog bus to configure larger multiplexers as required, eliminating external wiring and helping reduce unterminated stubs. Internal residual voltage discharge relays can be enabled to momentarily short out the measurement path when changing from one input channel to the next. This dissipates any voltage held by the wiring and instrument input capacitance. These relays protect sensitive devices, such as CMOS circuits, from residual voltages caused by previous high-voltage measurements. This feature can also be disabled in low-voltage applications where maximum throughput speed is important.

The EX1200-3096 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details (discussed in the *VTEX Switch Driver Programmer's Manual*, P/N: 82-0117-000). Figure 4-21 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available. An optional terminal block provides locking-slide termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

CONNECTOR PINS AND SIGNALS

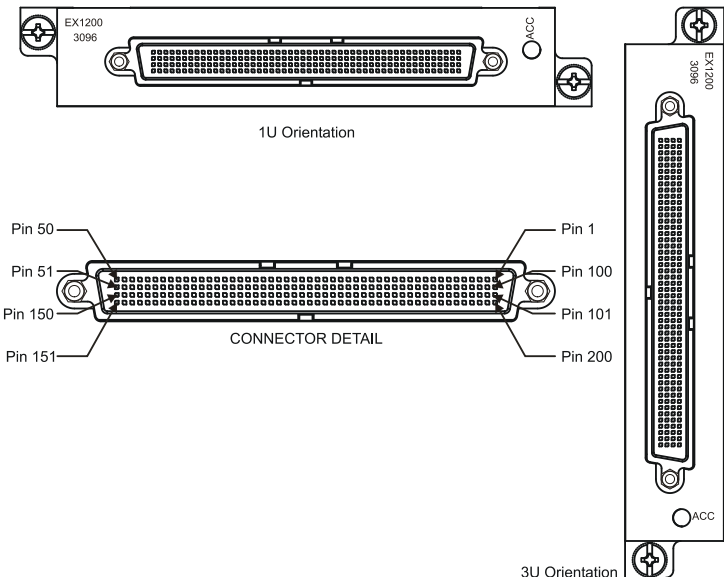


FIGURE 4-20: EX1200-3096 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH1_1L	**51**	CH2_COML	**101**	CH1_25L	**151**	SHIELD
2	CH1_1H	**52**	CH2_24H	**102**	CH1_25H	**152**	CH2_48H
3	CH1_2L	**53**	CH2_24L	**103**	CH1_26L	**153**	CH2_48L
4	CH1_2H	**54**	CH2_23H	**104**	CH1_26H	**154**	CH2_47H
5	CH1_3L	**55**	CH2_23L	**105**	CH1_27L	**155**	CH2_47L
6	CH1_3H	**56**	CH2_22H	**106**	CH1_27H	**156**	CH2_46H
7	CH1_4L	**57**	CH2_22L	**107**	CH1_28L	**157**	CH2_46L
8	CH1_4H	**58**	CH2_21H	**108**	CH1_28H	**158**	CH2_45H
9	CH1_5L	**59**	CH2_21L	**109**	CH1_29L	**159**	CH2_45L
10	CH1_5H	**60**	CH2_20H	**110**	CH1_29H	**160**	CH2_44H
11	CH1_6L	**61**	CH2_20L	**111**	CH1_30L	**161**	CH2_44L
12	CH1_6H	**62**	CH2_19H	**112**	CH1_30H	**162**	CH2_43H
13	CH1_7L	**63**	CH2_19L	**113**	CH1_31L	**163**	CH2_43L
14	CH1_7H	**64**	CH2_18H	**114**	CH1_31H	**164**	CH2_42H
15	CH1_8L	**65**	CH2_18L	**115**	CH1_32L	**165**	CH2_42L
16	CH1_8H	**66**	CH2_17H	**116**	CH1_32H	**166**	CH2_41H
17	CH1_9L	**67**	CH2_17L	**117**	CH1_33L	**167**	CH2_41L
18	CH1_9H	**68**	CH2_16H	**118**	CH1_33H	**168**	CH2_40H
19	CH1_10L	**69**	CH2_16L	**119**	CH1_34L	**169**	CH2_40L
20	CH1_10H	**70**	CH2_15H	**120**	CH1_34H	**170**	CH2_39H
21	CH1_11L	**71**	CH2_15L	**121**	CH1_35L	**171**	CH2_39L
22	CH1_11H	**72**	CH2_14H	**122**	CH1_35H	**172**	CH2_38H
23	CH1_12L	**73**	CH2_14L	**123**	CH1_36L	**173**	CH2_38L
24	CH1_12H	**74**	CH2_13H	**124**	CH1_36H	**174**	CH2_37H
25	CH1_COML	**75**	CH2_13L	**125**	GND_C	**175**	CH2_37L
26	CH2_1L	**76**	CH1_COMH	**126**	CH2_25L	**176**	GND_C
27	CH2_1H	**77**	CH1_24H	**127**	CH2_25H	**177**	CH1_48H
28	CH2_2L	**78**	CH1_24L	**128**	CH2_26L	**178**	CH1_48L
29	CH2_2H	**79**	CH1_23H	**129**	CH2_26H	**179**	CH1_47H
30	CH2_3L	**80**	CH1_23L	**130**	CH2_27L	**180**	CH1_47L
31	CH2_3H	**81**	CH1_22H	**131**	CH2_27H	**181**	CH1_46H
32	CH2_4L	**82**	CH1_22L	**132**	CH2_28L	**182**	CH1_46L
33	CH2_4H	**83**	CH1_21H	**133**	CH2_28H	**183**	CH1_45H
34	CH2_5L	**84**	CH1_21L	**134**	CH2_29L	**184**	CH1_45L
35	CH2_5H	**85**	CH1_20H	**135**	CH2_29H	**185**	CH1_44H
36	CH2_6L	**86**	CH1_20L	**136**	CH2_30L	**186**	CH1_44L
37	CH2_6H	**87**	CH1_19H	**137**	CH2_30H	**187**	CH1_43H
38	CH2_7L	**88**	CH1_19L	**138**	CH2_31L	**188**	CH1_43L
39	CH2_7H	**89**	CH1_18H	**139**	CH2_31H	**189**	CH1_42H
40	CH2_8L	**90**	CH1_18L	**140**	CH2_32L	**190**	CH1_42L
41	CH2_8H	**91**	CH1_17H	**141**	CH2_32H	**191**	CH1_41H
42	CH2_9L	**92**	CH1_17L	**142**	CH2_33L	**192**	CH1_41L
43	CH2_9H	**93**	CH1_16H	**143**	CH2_33H	**193**	CH1_40H
44	CH2_10L	**94**	CH1_16L	**144**	CH2_34L	**194**	CH1_40L
45	CH2_10H	**95**	CH1_15H	**145**	CH2_34H	**195**	CH1_39H
46	CH2_11L	**96**	CH1_15L	**146**	CH2_35L	**196**	CH1_39L
47	CH2_11H	**97**	CH1_14H	**147**	CH2_35H	**197**	CH1_38H
48	CH2_12L	**98**	CH1_14L	**148**	CH2_36L	**198**	CH1_38L
49	CH2_12H	**99**	CH1_13H	**149**	CH2_36H	**199**	CH1_37H
50	CH2_COMH	**100**	CH1_13L	**150**	SHIELD	**200**	CH1_37L

TABLE 4-17: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-3096 incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-17.

The module also incorporates ground pins, labeled “GND_C” above. These pins tie the module to chassis ground. Note that the SHIELD pins are not tied to ground and have no electrical connections.

LOGICAL DIAGRAM

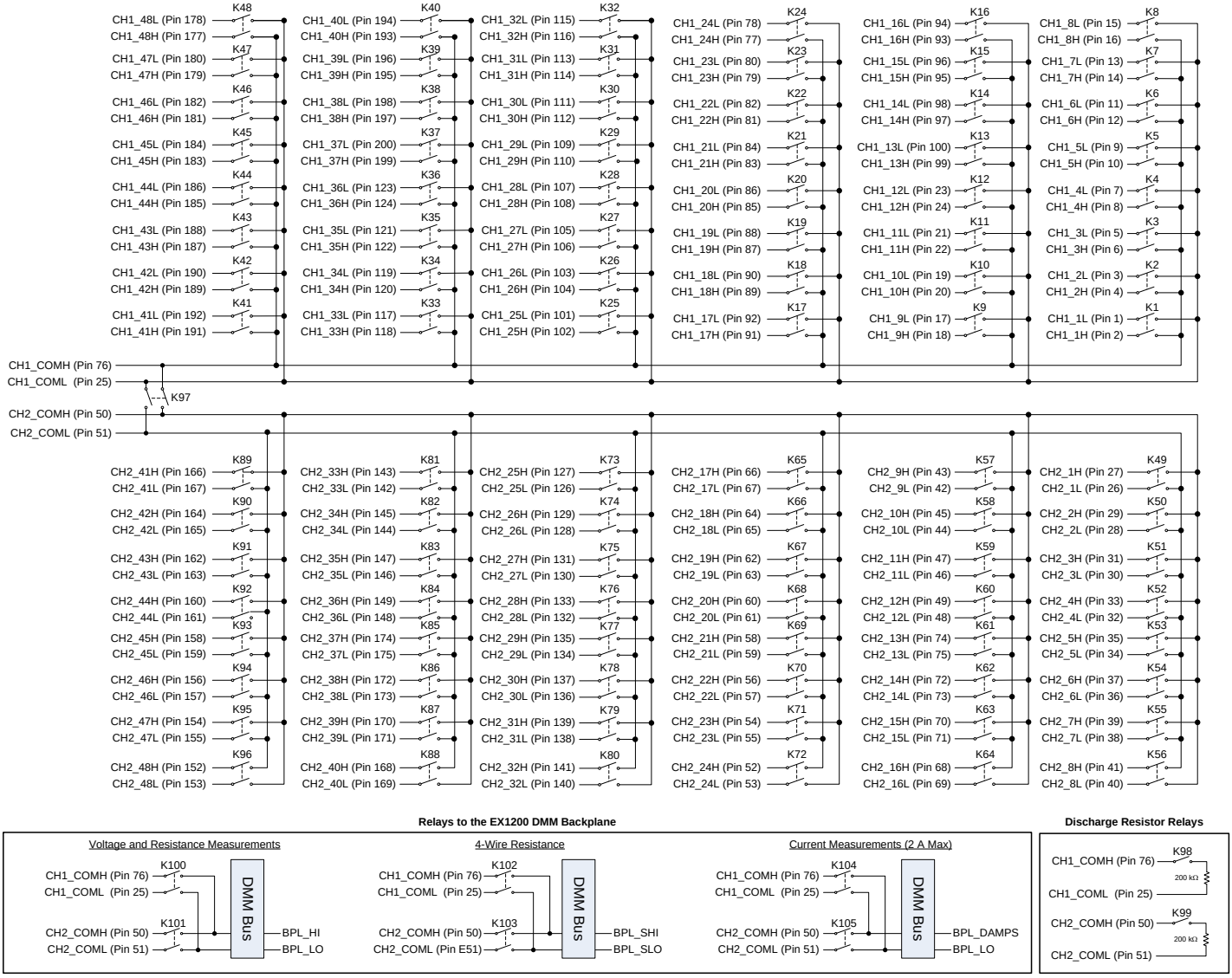

K48 CH1_48L (Pin 178) CH1_48H (Pin 177)
K47 CH1_47L (Pin 180) CH1_47H (Pin 179)
K46 CH1_46L (Pin 182) CH1_46H (Pin 181)
K45 CH1_45L (Pin 184) CH1_45H (Pin 183)
K44 CH1_44L (Pin 186) CH1_44H (Pin 185)
K43 CH1_43L (Pin 188) CH1_43H (Pin 187)
K42 CH1_42L (Pin 190) CH1_42H (Pin 189)
K41 CH1_41L (Pin 192) CH1_41H (Pin 191)
K40 CH1_40L (Pin 194) CH1_40H (Pin 193)
K39 CH1_39L (Pin 196) CH1_39H (Pin 195)
K38 CH1_38L (Pin 198) CH1_38H (Pin 197)
K37 CH1_37L (Pin 200) CH1_37H (Pin 199)
K36 CH1_36L (Pin 123) CH1_36H (Pin 124)
K35 CH1_35L (Pin 121) CH1_35H (Pin 122)
K34 CH1_34L (Pin 119) CH1_34H (Pin 120)
K33 CH1_33L (Pin 117) CH1_33H (Pin 118)
K32 CH1_32L (Pin 115) CH1_32H (Pin 116)
K31 CH1_31L (Pin 113) CH1_31H (Pin 114)
K30 CH1_30L (Pin 111) CH1_30H (Pin 112)
K29 CH1_29L (Pin 109) CH1_29H (Pin 110)
K28 CH1_28L (Pin 107) CH1_28H (Pin 108)
K27 CH1_27L (Pin 105) CH1_27H (Pin 106)
K26 CH1_26L (Pin 103) CH1_26H (Pin 104)
K25 CH1_25L (Pin 101) CH1_25H (Pin 102)
K24 CH1_24L (Pin 78) CH1_24H (Pin 77)
K23 CH1_23L (Pin 80) CH1_23H (Pin 79)
K22 CH1_22L (Pin 82) CH1_22H (Pin 81)
K21 CH1_21L (Pin 84) CH1_21H (Pin 83)
K20 CH1_20L (Pin 86) CH1_20H (Pin 85)
K19 CH1_19L (Pin 88) CH1_19H (Pin 87)
K18 CH1_18L (Pin 90) CH1_18H (Pin 89)
K17 CH1_17L (Pin 92) CH1_17H (Pin 91)
K16 CH1_16L (Pin 94) CH1_16H (Pin 93)
K15 CH1_15L (Pin 96) CH1_15H (Pin 95)
K14 CH1_14L (Pin 98) CH1_14H (Pin 97)
K13 CH1_13L (Pin 100) CH1_13H (Pin 99)
K12 CH1_12L (Pin 23) CH1_12H (Pin 24)
K11 CH1_11L (Pin 21) CH1_11H (Pin 22)
K10 CH1_10L (Pin 19) CH1_10H (Pin 20)
K9 CH1_9L (Pin 17) CH1_9H (Pin 18)
K8 CH1_8L (Pin 15) CH1_8H (Pin 16)
K7 CH1_7L (Pin 13) CH1_7H (Pin 14)
K6 CH1_6L (Pin 11) CH1_6H (Pin 12)
K5 CH1_5L (Pin 9) CH1_5H (Pin 10)
K4 CH1_4L (Pin 7) CH1_4H (Pin 8)
K3 CH1_3L (Pin 5) CH1_3H (Pin 6)
K2 CH1_2L (Pin 3) CH1_2H (Pin 4)
K1 CH1_1L (Pin 1) CH1_1H (Pin 2)
CH1_COMH (Pin 76)
CH1_COML (Pin 25)
K97
CH2_COMH (Pin 50)
CH2_COML (Pin 51)
K89 CH2_41H (Pin 166) CH2_41L (Pin 167)
K90 CH2_42H (Pin 164) CH2_42L (Pin 165)
K91 CH2_43H (Pin 162) CH2_43L (Pin 163)
K92 CH2_44H (Pin 160) CH2_44L (Pin 161)
K93 CH2_45H (Pin 158) CH2_45L (Pin 159)
K94 CH2_46H (Pin 156) CH2_46L (Pin 157)
K95 CH2_47H (Pin 154) CH2_47L (Pin 155)
K96 CH2_48H (Pin 152) CH2_48L (Pin 153)
K81 CH2_33H (Pin 143) CH2_33L (Pin 142)
K82 CH2_34H (Pin 145) CH2_34L (Pin 144)
K83 CH2_35H (Pin 147) CH2_35L (Pin 146)
K84 CH2_36H (Pin 149) CH2_36L (Pin 148)
K85 CH2_37H (Pin 174) CH2_37L (Pin 175)
K86 CH2_38H (Pin 172) CH2_38L (Pin 173)
K87 CH2_39H (Pin 170) CH2_39L (Pin 171)
K88 CH2_40H (Pin 168) CH2_40L (Pin 169)
K73 CH2_25H (Pin 127) CH2_25L (Pin 126)
K74 CH2_26H (Pin 129) CH2_26L (Pin 128)
K75 CH2_27H (Pin 131) CH2_27L (Pin 130)
K76 CH2_28H (Pin 133) CH2_28L (Pin 132)
K77 CH2_29H (Pin 135) CH2_29L (Pin 134)
K78 CH2_30H (Pin 137) CH2_30L (Pin 136)
K79 CH2_31H (Pin 139) CH2_31L (Pin 138)
K80 CH2_32H (Pin 141) CH2_32L (Pin 140)
K65 CH2_17H (Pin 66) CH2_17L (Pin 67)
K66 CH2_18H (Pin 64) CH2_18L (Pin 65)
K67 CH2_19H (Pin 62) CH2_19L (Pin 63)
K68 CH2_20H (Pin 60) CH2_20L (Pin 61)
K69 CH2_21H (Pin 58) CH2_21L (Pin 59)
K70 CH2_22H (Pin 56) CH2_22L (Pin 57)
K71 CH2_23H (Pin 54) CH2_23L (Pin 55)
K72 CH2_24H (Pin 52) CH2_24L (Pin 53)
K57 CH2_9H (Pin 43) CH2_9L (Pin 42)
K58 CH2_10H (Pin 45) CH2_10L (Pin 44)
K59 CH2_11H (Pin 47) CH2_11L (Pin 46)
K60 CH2_12H (Pin 49) CH2_12L (Pin 48)
K61 CH2_13H (Pin 74) CH2_13L (Pin 75)
K62 CH2_14H (Pin 72) CH2_14L (Pin 73)
K63 CH2_15H (Pin 70) CH2_15L (Pin 71)
K64 CH2_16H (Pin 68) CH2_16L (Pin 69)
K49 CH2_1H (Pin 27) CH2_1L (Pin 26)
K50 CH2_2H (Pin 29) CH2_2L (Pin 28)
K51 CH2_3H (Pin 31) CH2_3L (Pin 30)
K52 CH2_4H (Pin 33) CH2_4L (Pin 32)
K53 CH2_5H (Pin 35) CH2_5L (Pin 34)
K54 CH2_6H (Pin 37) CH2_6L (Pin 36)
K55 CH2_7H (Pin 39) CH2_7L (Pin 38)
K56 CH2_8H (Pin 41) CH2_8L (Pin 40)
Relays to the EX1200 DMM Backplane
Voltage and Resistance Measurements
K100
CH1_COMH (Pin 76)
CH1_COML (Pin 25)
K101
CH2_COMH (Pin 50)
CH2_COML (Pin 51)
DMM Bus
BPL_HI
BPL_LO
4-Wire Resistance
K102
CH1_COMH (Pin 76)
CH1_COML (Pin 25)
K103
CH2_COMH (Pin 50)
CH2_COML (Pin E51)
DMM Bus
BPL_SHI
BPL_SLO
Current Measurements (2 A Max)
K104
CH1_COMH (Pin 76)
CH1_COML (Pin 25)
K105
CH2_COMH (Pin 50)
CH2_COML (Pin 51)
DMM Bus
BPL_DAMPS
BPL_LO
Discharge Resistor Relays
K98
200 kΩ
CH1_COMH (Pin 76)
CH1_COML (Pin 25)
K99
200 kΩ
CH2_COMH (Pin 50)
CH2_COML (Pin 51)

FIGURE 4-21: EX1200-3096 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH1_1L	1	T52	CH1_8H	16	T103	CH2_27L	130	T154	CH2_41H	166
T2	CH1_1H	2	T53	CH1_19L	88	T104	CH2_27H	131	T155	CH2_29L	134
T3	CH1_13L	100	T54	CH1_19H	87	T105	CH2_39L	171	T156	CH2_29H	135
T4	CH1_13H	99	T55	CH1_7L	13	T106	CH2_39H	170	T157	CH2_40L	169
T5	CH1_2L	3	T56	CH1_7H	14	T107	CH2_26L	128	T158	CH2_40H	168
T6	CH1_2H	4	T57	CH1_18L	90	T108	CH2_26H	129	T159	CH2_28L	132
T7	CH1_14L	98	T58	CH1_18H	89	T109	CH2_37L	175	T160	CH2_28H	133
T8	CH1_14H	97	T59	CH1_6L	11	T110	CH2_37H	174	T161	CH2_12H	49
T9	CH1_3L	5	T60	CH1_6H	12	T111	CH2_25L	126	T162	CH2_12L	48
T10	CH1_3H	6	T61	CH1_46L	182	T112	CH2_25H	127	T163	CH2_24L	53
T11	CH1_15L	96	T62	CH1_46H	181	T113	CH1_48L	178	T164	CH2_24H	52
T12	CH1_15H	95	T63	CH1_34L	119	T114	CH1_48H	177	T165	CH2_COMH	50
T13	CH1_4L	7	T64	CH1_34H	120	T115	CH1_36L	123	T166	CH2_COML	51
T14	CH1_4H	8	T65	CH1_45L	184	T116	CH1_36H	124	T167	CH2_23L	55
T15	CH1_16L	94	T66	CH1_45H	183	T117	CH1_47L	180	T168	CH2_23H	54
T16	CH1_16H	93	T67	CH1_33L	117	T118	CH1_47H	179	T169	CH2_11L	46
T17	CH1_5L	9	T68	CH1_33H	118	T119	CH1_35L	121	T170	CH2_11H	47
T18	CH1_5H	10	T69	CH1_44L	186	T120	CH1_35H	122	T171	CH2_22L	57
T19	CH1_17L	92	T70	CH1_44H	185	T121	CH2_8L	40	T172	CH2_22H	56
T20	CH1_17H	91	T71	CH1_32L	115	T122	CH2_8H	41	T173	CH2_10L	44
T21	CH1_25L	101	T72	CH1_32H	116	T123	CH2_19L	63	T174	CH2_10H	45
T22	CH1_25H	102	T73	CH1_43L	188	T124	CH2_19H	62	T175	CH2_21L	59
T23	CH1_37L	200	T74	CH1_43H	187	T125	CH2_7L	38	T176	CH2_21H	58
T24	CH1_37H	199	T75	CH1_31L	113	T126	CH2_7H	39	T177	CH2_9L	42
T25	CH1_26L	103	T76	CH1_31H	114	T127	CH2_18L	65	T178	CH2_9H	43
T26	CH1_26H	104	T77	CH1_42L	190	T128	CH2_18H	64	T179	CH2_20L	61
T27	CH1_38L	198	T78	CH1_42H	189	T129	CH2_6L	36	T180	CH2_20H	60
T28	CH1_38H	197	T79	CH1_30L	111	T130	CH2_6H	37	T181	UNUSED	N/A
T29	CH1_27L	105	T80	CH1_30H	112	T131	CH2_17L	67	T182	UNUSED	N/A
T30	CH1_27H	106	T81	CH2_2L	28	T132	CH2_17H	66	T183	UNUSED	N/A
T31	CH1_39L	196	T82	CH2_2H	29	T133	CH2_5L	34	T184	UNUSED	N/A
T32	CH1_39H	195	T83	CH2_14L	73	T134	CH2_5H	35	T185	CH2_48L	153
T33	CH1_28L	107	T84	CH2_14H	72	T135	CH2_16L	69	T186	CH2_48H	152
T34	CH1_28H	108	T85	CH2_3L	30	T136	CH2_16H	68	T187	CH2_36L	148
T35	CH1_40L	194	T86	CH2_3H	31	T137	CH2_4L	32	T188	CH2_36H	149
T36	CH1_40H	193	T87	CH2_13L	75	T138	CH2_4H	33	T189	CH2_47L	155
T37	CH1_29L	109	T88	CH2_13H	74	T139	CH2_15L	71	T190	CH2_47H	154
T38	CH1_29H	110	T89	CH2_1L	26	T140	CH2_15H	70	T191	CH2_35L	146
T39	CH1_41L	192	T90	CH2_1H	27	T141	CH2_44L	161	T192	CH2_35H	147
T40	CH1_41H	191	T91	CH1_COML	25	T142	CH2_44H	160	T193	CH2_46L	157
T41	CH1_22L	82	T92	CH1_COMH	76	T143	CH2_32L	140	T194	CH2_46H	156
T42	CH1_22H	81	T93	CH1_24L	78	T144	CH2_32H	141	T195	CH2_34L	144
T43	CH1_10L	19	T94	CH1_24H	77	T145	CH2_43L	163	T196	CH2_34H	145
T44	CH1_10H	20	T95	CH1_12L	23	T146	CH2_43H	162	T197	CH2_45L	159
T45	CH1_21L	84	T96	CH1_12H	24	T147	CH2_31L	138	T198	CH2_45H	158
T46	CH1_21H	83	T97	CH1_23L	80	T148	CH2_31H	139	T199	CH2_33L	142
T47	CH1_9L	17	T98	CH1_23H	79	T149	CH2_42L	165	T200	CH2_33H	143
T48	CH1_9H	18	T99	CH1_11L	21	T150	CH2_42H	164	T201	SHIELD	150
T49	CH1_20L	86	T100	CH1_11H	22	T151	CH2_30L	136	T202	SHIELD	151
T50	CH1_20H	85	T101	CH2_38L	173	T152	CH2_30H	137	T203	GND_C	125
T51	CH1_8L	15	T102	CH2_38H	172	T153	CH2_41L	167	T204	GND_C	176

TABLE 4-19: EX1200-TB200 TERMINAL BLOCK TO EX1200-3096 PIN MAPPING

RT1 can be measured by the EX1200 DMM or may be measured using an external instrument. To use an external instrument, connect it to T183 (L_VS) and T184 (H_VS). To use a sensor other than the onboard thermistor, connect it using T181 (RL_I) and T182 (RH_I). Note that CH1_1L (T1) and CH1_1H (T2) must be dedicated to making temperature measurements once P2 is configured.

EX1200-3096 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	(1 x 96) 2-wire, dual (1 x 48) 2-wire, or (1 x 48) 4-wire
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V ac rms, 240 V dc
MAXIMUM SWITCHING CURRENT	
	1 A
MAXIMUM SWITCHING POWER	
	30 W dc (resistive), 37.5 VA (resistive)
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^7
Electrical	1×10^5 @ 30 V dc 1 A (resistive) or 125 V ac 0.3 A (resistive),
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 500 mΩ
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 7 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	30 MHz (typical)
CROSSTALK (TYPICAL)	
1 MHz	< -70 dB
10 MHz	< -50 dB
ISOLATION (TYPICAL)	
1 MHz	< -50 dB
10 MHz	< -35 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3164 PLUG-IN MODULE

16 (1X4) 2-WIRE 300 V/ 2 AMP MULTIPLEXER

The EX1200-3164 high-density multiplexer module is designed to provide a flexible switching multiplexing architecture with 16 individual 1 x 4 2-wire multiplexers. Up to 96 1 x 4 two-wire channels can be accommodated in a 1U EX1200 full rack mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. Applications include cable harness testing, semiconductor and PCB testing, and those in which multiple points need to be switched to a common resource. All relays also have individual control, and each path allows for hot switching of up to 300 V and 2 A (60 W dc max).

Each bank can be interconnected within a module under program control (via bussing relays) to form larger 2-wire muxes, up to a maximum of 1 x 64. The EX1200 analog bus can be used to configure larger multiplexers across modules as required to eliminate external wiring and helps reduce unterminated stubs effects. The analog bus can also be routed directly to the optional EX1200 series 6.5 digit DMM for direct measurements across the backplane further reduce external wiring. Stub-breaking relays remove the module from the analog bus to minimize a module's effect on measurements being made through other modules.

An optional terminal block provides screw termination points for external field wiring. This terminal block also includes cold junction compensation reference for more precise temperature measurements.

The EX1200-3164 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-23 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

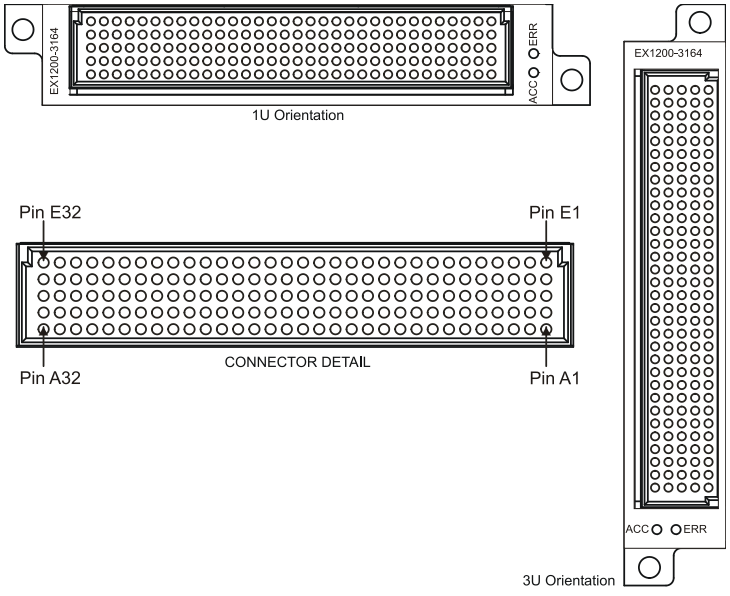


FIGURE 4-22: EX1200-3164 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH5_COMH	**1**	CH4_2H	**1**	CH4_COMH	**1**	CH5_2H	**1**	CH5_4H
2	CH5_COML	**2**	CH4_2L	**2**	CH4_COML	**2**	CH5_2L	**2**	CH5_4L
3	CH5_3H	**3**	CH4_4H	**3**	CH6_4H	**3**	CH4_1H	**3**	CH5_1H
4	CH5_3L	**4**	CH4_4L	**4**	CH6_4L	**4**	CH4_1L	**4**	CH5_1L
5	CH4_3H	**5**	CH3_2H	**5**	CH3_COMH	**5**	CH6_2H	**5**	CH6_COMH
6	CH4_3L	**6**	CH3_2L	**6**	CH3_COML	**6**	CH6_2L	**6**	CH6_COML
7	CH6_3H	**7**	CH3_4H	**7**	CH7_4H	**7**	CH3_1H	**7**	CH6_1H
8	CH6_3L	**8**	CH3_4L	**8**	CH7_4L	**8**	CH3_1L	**8**	CH6_1L
9	CH3_3H	**9**	CH2_2H	**9**	CH2_COMH	**9**	CH7_2H	**9**	CH7_COMH
10	CH3_3L	**10**	CH2_2L	**10**	CH2_COML	**10**	CH7_2L	**10**	CH7_COML
11	CH7_3H	**11**	CH2_4H	**11**	CH8_4H	**11**	CH2_1H	**11**	CH7_1H
12	CH7_3L	**12**	CH2_4L	**12**	CH8_4L	**12**	CH2_1L	**12**	CH7_1L
13	CH2_3H	**13**	CH1_2H	**13**	CH1_COMH	**13**	CH8_2H	**13**	CH8_COMH
14	CH2_3L	**14**	CH1_2L	**14**	CH1_COML	**14**	CH8_2L	**14**	CH8_COML
15	CH8_3H	**15**	CH1_4H	**15**	CH16_4H	**15**	CH1_1H	**15**	CH8_1H
16	CH8_3L	**16**	CH1_4L	**16**	CH16_4L	**16**	CH1_1L	**16**	CH8_1L
17	CH1_3H	**17**	CH9_2H	**17**	CH9_COMH	**17**	CH16_1H	**17**	CH16_2H
18	CH1_3L	**18**	CH9_2L	**18**	CH9_COML	**18**	CH16_1L	**18**	CH16_2L
19	CH16_COMH	**19**	CH16_3H	**19**	CH15_4H	**19**	CH9_1H	**19**	CH15_1H
20	CH16_COML	**20**	CH16_3L	**20**	CH15_4L	**20**	CH9_1L	**20**	CH15_1L
21	CH9_4H	**21**	CH10_2H	**21**	CH10_COMH	**21**	CH14_1H	**21**	CH15_2H
22	CH9_4L	**22**	CH10_2L	**22**	CH10_COML	**22**	CH14_1L	**22**	CH15_2L
23	CH9_3H	**23**	CH15_COMH	**23**	CH14_2H	**23**	CH10_1H	**23**	CH14_4H
24	CH9_3L	**24**	CH15_COML	**24**	CH14_2L	**24**	CH10_1L	**24**	CH14_4L
25	CH15_3H	**25**	CH11_COMH	**25**	CH11_1H	**25**	CH13_1H	**25**	CH10_4H
26	CH15_3L	**26**	CH11_COML	**26**	CH11_1L	**26**	CH13_1L	**26**	CH10_4L
27	CH10_3H	**27**	CH11_4H	**27**	CH13_3H	**27**	CH11_2H	**27**	CH13_4H
28	CH10_3L	**28**	CH11_4L	**28**	CH13_3L	**28**	CH11_2L	**28**	CH13_4L
29	CH14_COMH	**29**	CH12_2H	**29**	CH12_1H	**29**	CH11_3H	**29**	CH14_3H
30	CH14_COML	**30**	CH12_2L	**30**	CH12_1L	**30**	CH11_3L	**30**	CH14_3L
31	CH12_4H	**31**	CH13_COMH	**31**	CH12_3H	**31**	CH12_COMH	**31**	CH13_2H
32	CH12_4L	**32**	CH13_COML	**32**	CH12_3L	**32**	CH12_COML	**32**	CH13_2L

TABLE 4-20: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

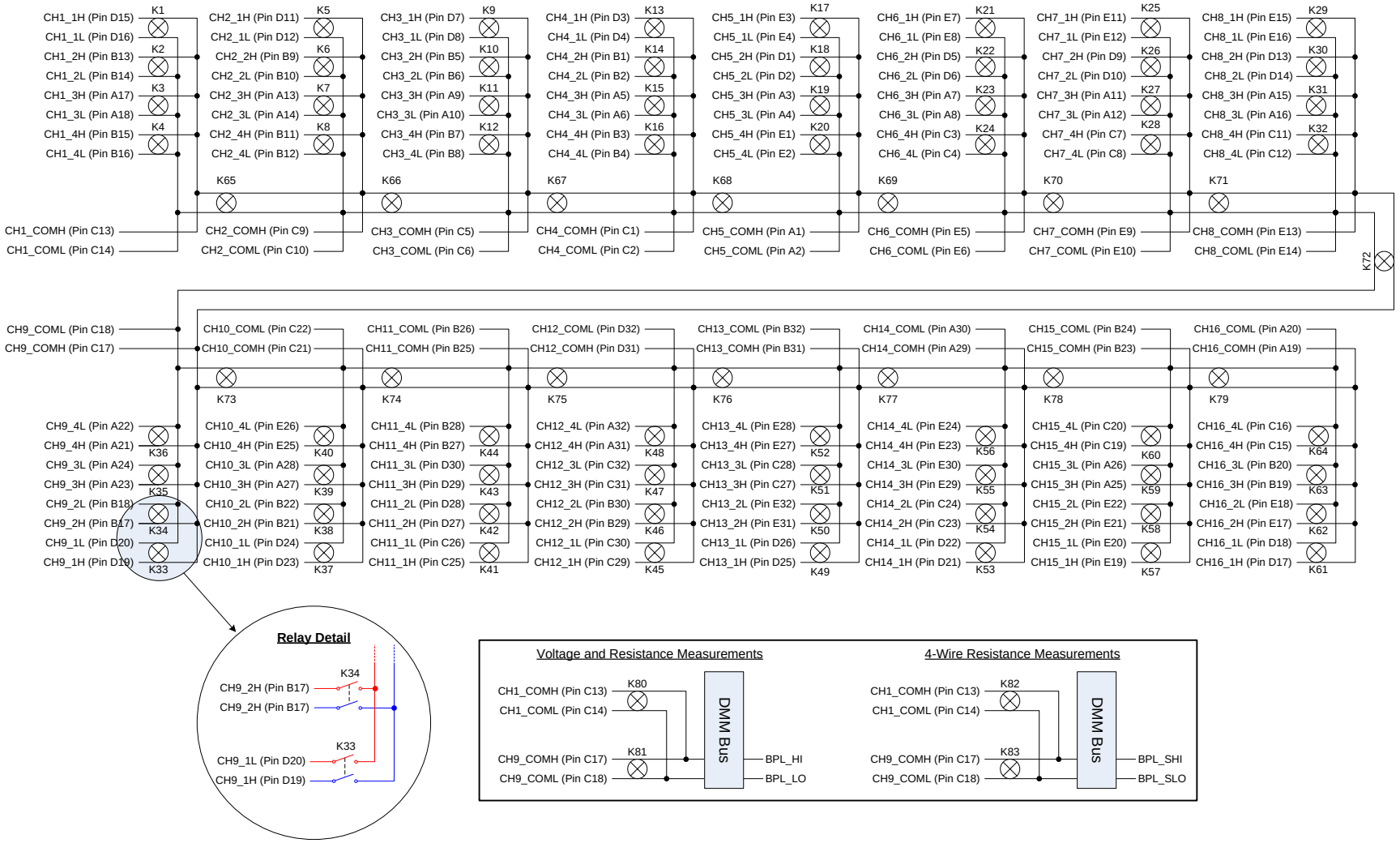


FIGURE 4-23: EX1200-3164 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH4_1L	D4	T41	CH11_2L	D28	T81	CH11_4L	B28	T121	CH9_4H	A21
T2	CH4_1H	D3	T42	CH11_2H	D27	T82	CH11_4H	B27	T122	CH9_4L	A22
T3	CH6_2L	D6	T43	CH13_1L	D26	T83	CH12_2L	B30	T123	CH16_COMH	A19
T4	CH6_2H	D5	T44	CH13_1H	D25	T84	CH12_2H	B29	T124	CH16_COML	A20
T5	CH3_1L	D8	T45	CH10_1L	D24	T85	CH13_COML	B32	T125	CH1_3H	A17
T6	CH3_1H	D7	T46	CH10_1H	D23	T86	CH13_COMH	B31	T126	CH1_3L	A18
T7	CH7_2L	D10	T47	CH14_1L	D22	T87	CH4_COML	C2	T127	CH8_3H	A15
T8	CH7_2H	D9	T48	CH14_1H	D21	T88	CH4_COMH	C1	T128	CH8_3L	A16
T9	CH2_1L	D12	T49	CH16_3L	B20	T89	CH6_4L	C4	T129	CH13_4L	E28
T10	CH2_1H	D11	T50	CH16_3H	B19	T90	CH6_4H	C3	T130	CH13_4H	E27
T11	CH8_2L	D14	T51	CH5_COMH	A1	T91	CH3_COML	C6	T131	CH10_4L	E26
T12	CH8_2H	D13	T52	CH5_COML	A2	T92	CH3_COMH	C5	T132	CH10_4H	E25
T13	CH1_1L	D16	T53	CH5_3H	A3	T93	CH7_4L	C8	T133	CH14_3L	E30
T14	CH1_1H	D15	T54	CH5_3L	A4	T94	CH7_4H	C7	T134	CH14_3H	E29
T15	CH16_1L	D18	T55	CH4_3H	A5	T95	CH2_COML	C10	T135	CH13_3L	C28
T16	CH16_1H	D17	T56	CH4_3L	A6	T96	CH2_COMH	C9	T136	CH13_3H	C27
T17	CH3_2L	B6	T57	CH6_3H	A7	T97	CH15_1L	E20	T137	CH12_1L	C30
T18	CH3_2H	B5	T58	CH6_3L	A8	T98	CH15_1H	E19	T138	CH12_1H	C29
T19	CH4_4L	B4	T59	CH11_COML	B26	T99	CH8_1L	E16	T139	CH11_1H	C25
T20	CH4_4H	B3	T60	CH11_COMH	B25	T100	CH8_1H	E15	T140	CH11_1L	C26
T21	CH3_4L	B8	T61	CH15_COML	B24	T101	CH15_2L	E22	T141	CH14_2H	C23
T22	CH3_4H	B7	T62	CH15_COMH	B23	T102	CH15_2H	E21	T142	CH14_2L	C24
T23	CH2_2L	B10	T63	CH10_2L	B22	T103	CH14_4L	E24	T143	CH9_COML	C18
T24	CH2_2H	B9	T64	CH10_2H	B21	T104	CH14_4H	E23	T144	CH9_COMH	C17
T25	CH2_4L	B12	T65	CH11_3L	D30	T105	CH8_COML	E14	T145	CH10_COMH	C21
T26	CH2_4H	B11	T66	CH11_3H	D29	T106	CH8_COMH	E13	T146	CH10_COML	C22
T27	CH1_2L	B14	T67	CH12_COML	D32	T107	CH7_1L	E12	T147	CH15_4H	C19
T28	CH1_2H	B13	T68	CH12_COMH	D31	T108	CH7_1H	E11	T148	CH15_4L	C20
T29	CH1_4L	B16	T69	CH5_4L	E2	T109	CH7_COML	E10	T149	CH15_3H	A25
T30	CH1_4H	B15	T70	CH5_4H	E1	T110	CH7_COMH	E9	T150	CH15_3L	A26
T31	CH9_2L	B18	T71	CH5_1L	E4	T111	CH6_1L	E8	T151	CH10_3H	A27
T32	CH9_2H	B17	T72	CH5_1H	E3	T112	CH6_1H	E7	T152	CH10_3L	A28
T33	CH9_1L	D20	T73	CH6_COML	E6	T113	CH8_4L	C12	T153	CH14_COMH	A29
T34	CH9_1H	D19	T74	CH6_COMH	E5	T114	CH8_4H	C11	T154	CH14_COML	A30
T35	CH3_3H	A9	T75	CH16_2H	E17	T115	CH1_COML	C14	T155	CH13_2H	E31
T36	CH3_3L	A10	T76	CH16_2L	E18	T116	CH1_COMH	C13	T156	CH13_2L	E32
T37	CH7_3H	A11	T77	CH5_2L	D2	T117	CH16_4L	C16	T157	CH12_3H	C31
T38	CH7_3L	A12	T78	CH5_2H	D1	T118	CH16_4H	C15	T158	CH12_3L	C32
T39	CH2_3H	A13	T79	CH4_2L	B2	T119	CH9_3H	A23	T159	CH12_4H	A31
T40	CH2_3L	A14	T80	CH4_2H	B1	T120	CH9_3L	A24	T160	CH12_4L	A32

TABLE 4-21: EX1200-TB160-2 TERMINAL BLOCK TO EX1200-3164 PIN MAPPING

RT1 can be measured by the EX1200 DMM or may be measured using an external instrument. If an external sensor is used, it must be connected to T164 (L_VS) and T163 (H_VS). The user may also choose to use a sensor other than the on-board thermistor. To do so, connect the sensor using T162 (RL_I) and T161 (RH_I). Note that CH4_1L (T1) and CH4_1H (T2) must be dedicated to making temperature measurements once P2 is configured.

EX1200-3164 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Configured as either 16 (1x4), 8 (1x8), 4 (1x16), 2 (1x32) or 1 (1x64) 2-wire multiplexers
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V dc, 300 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 500 mΩ
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 20 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	40 MHz (typical)
CROSSTALK (TYPICAL)	
1 MHz	< -70 dB
10 MHz	< -50 dB
ISOLATION (TYPICAL)	
1 MHz	< -55 dB
10 MHz	< -35 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-3824 PLUG-IN MODULE

8 (1 X 24) SOLID STATE, 100V/100MA MULTIPLEXER

The EX1200-3824 is a high speed multiplexer designed to provide flexible switching multiplexing architecture with 8 banks of 1 x 24 one-wire multiplexers. Upto 48 1 x 24 one-wire channels can be accommodated in a 1U EX1200 full rack mainframe for maximum density, or mixed and matched with other EX1200 plug-ins for flexibility. The solid-state design delivers maximum switching speed and near infinite life.

The EX1200-3824 may be used in applications in which its inputs are connected to DUT capable of producing signals that approach 100 V, with its commons being connected to high-speed measurement devices. In this type of applications, the input signal will need to be attenuated. For this very reason EX1200-3824 also has attenuator option, this will consist of user configurable 10KHz Low Pass Filter or 400KHz Low Pass Filter, refer to Figure 4-28 for configuring the LPF.

The EX1200-3824 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-29 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

EX1200-38TB the break out box (BOB) can be used along with the EX1200-3824. This EX1200-38TB can be mounted on the EX1200-3824 front panel, mates with 200 Pin connector directly.

EX1200-3824 STANDARD BOARD

Figure 4-24 explains the EX1200-3824 without Attenuator option. For the standard configuration a 0 Ohm resistor bypasses the attenuator circuit bringing out the 8 commons to the 200 pin front panel. This functions as a multiplexer module of 8 banks (1 x 24).

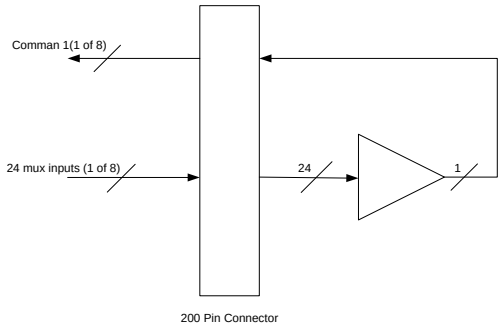


FIGURE 4-24: I/O IMPLEMENTATION, STANDARD EX1200-3824 BOARD

EX1200-3824 WITH ATTENUATOR OPTION

Figure 4-25 exlains the EX1200-3824 with Attenuator option, the 0 Ohm resistor is removed and the Mux outputs are fed through the attenuator circuit. The 8 common pins in the standard board will be treated as Ground Pins for connecting the DUT. Ground pins are dedicated to each bank contributing a total of 8 ground pins at the Front Panel Connector.

Attenuator Section comprises of two different user selectable low pass frequency options – 10 Khz and 400Khz. Jumpers are provided to select the frequencies. 10Khz LPF is selected if jumper is connected. 400 Khz LPF is selected if jumper is not connected. Refer Figure 4-28

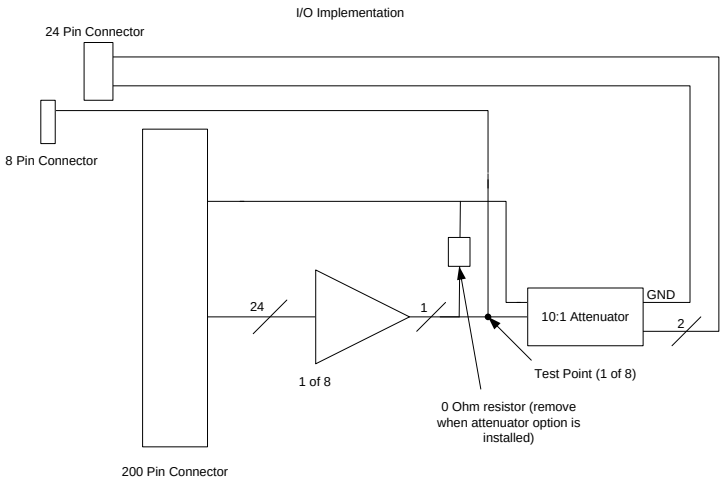


FIGURE 4-25: I/O IMPLEMENTATION, EX1200-3824 BOARD WITH ATTENUATOR OPTION

CONNECTOR PINS AND SIGNALS

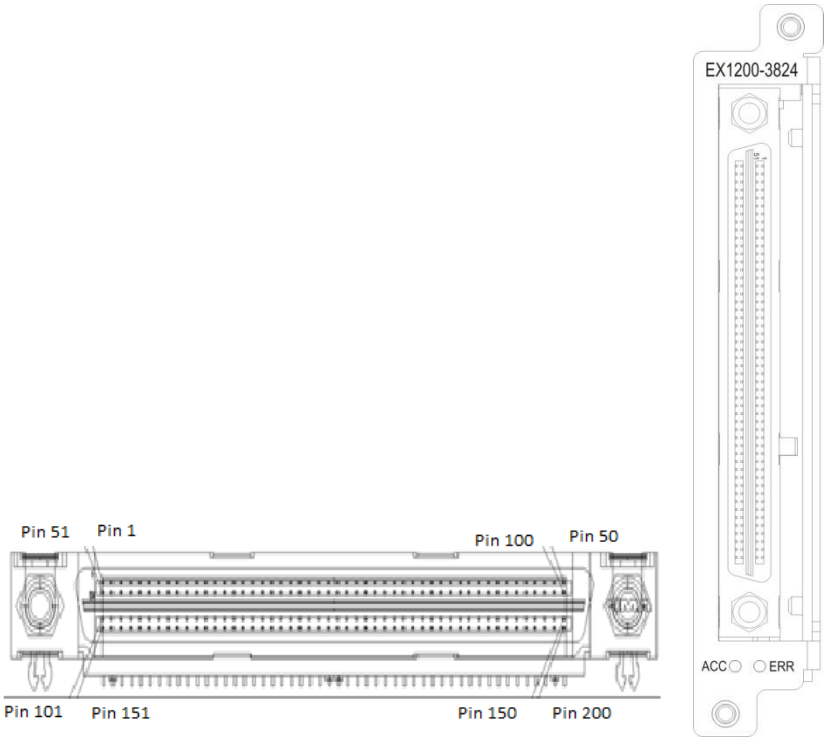


FIGURE 4-26: EX1200-3824 FRONT PANEL (FRONT VIEW)

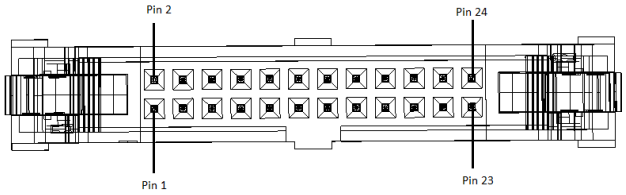
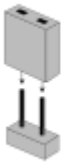


FIGURE 4-27: EX1200-3824, ATTENUATOR CONNECTOR 24-PIN



Jumper Close : 10 KHz LPF

Jumper Open : 400 KHz LPF

FIGURE 4-28: EX1200-3824, LOW PASS FILTER CONFIGURATION CONNECTOR 2-PIN

EX1200-3824 MUX CARD 200PIN CONNECTOR PINOUTS							
P1 PIN	**Desc**	P1 PIN	**Desc**	P1 PIN	**Desc**	P1 PIN	**Desc**
1	MUX1_CH_1	51	MUX3_CH_1	101	MUX5_CH_1	151	MUX7_CH_1
2	MUX1_CH_2	52	MUX3_CH_2	102	MUX5_CH_2	152	MUX7_CH_2
3	MUX1_CH_3	53	MUX3_CH_3	103	MUX5_CH_3	153	MUX7_CH_3
4	MUX1_CH_4	54	MUX3_CH_4	104	MUX5_CH_4	154	MUX7_CH_4
5	MUX1_CH_5	55	MUX3_CH_5	105	MUX5_CH_5	155	MUX7_CH_5
6	MUX1_CH_6	56	MUX3_CH_6	106	MUX5_CH_6	156	MUX7_CH_6
7	MUX1_CH_7	57	MUX3_CH_7	107	MUX5_CH_7	157	MUX7_CH_7
8	MUX1_CH_8	58	MUX3_CH_8	108	MUX5_CH_8	158	MUX7_CH_8
9	MUX1_CH_9	59	MUX3_CH_9	109	MUX5_CH_9	159	MUX7_CH_9
10	MUX1_CH_10	60	MUX3_CH_10	110	MUX5_CH_10	160	MUX7_CH_10
11	MUX1_CH_11	61	MUX3_CH_11	111	MUX5_CH_11	161	MUX7_CH_11
12	MUX1_CH_12	62	MUX3_CH_12	112	MUX5_CH_12	162	MUX7_CH_12
13	MUX1_(COM/GND)	63	MUX3_(COM/GND)	113	MUX5_(COM/GND)	163	MUX7_(COM/GND)
14	MUX1_CH_13	64	MUX3_CH_13	114	MUX5_CH_13	164	MUX7_CH_13
15	MUX1_CH_14	65	MUX3_CH_14	115	MUX5_CH_14	165	MUX7_CH_14
16	MUX1_CH_15	66	MUX3_CH_15	116	MUX5_CH_15	166	MUX7_CH_15
17	MUX1_CH_16	67	MUX3_CH_16	117	MUX5_CH_16	167	MUX7_CH_16
18	MUX1_CH_17	68	MUX3_CH_17	118	MUX5_CH_17	168	MUX7_CH_17
19	MUX1_CH_18	69	MUX3_CH_18	119	MUX5_CH_18	169	MUX7_CH_18
20	MUX1_CH_19	70	MUX3_CH_19	120	MUX5_CH_19	170	MUX7_CH_19
21	MUX1_CH_20	71	MUX3_CH_20	121	MUX5_CH_20	171	MUX7_CH_20
22	MUX1_CH_21	72	MUX3_CH_21	122	MUX5_CH_21	172	MUX7_CH_21
23	MUX1_CH_22	73	MUX3_CH_22	123	MUX5_CH_22	173	MUX7_CH_22
24	MUX1_CH_23	74	MUX3_CH_23	124	MUX5_CH_23	174	MUX7_CH_23
25	MUX1_CH_24	75	MUX3_CH_24	125	MUX5_CH_24	175	MUX7_CH_24
26	MUX2_CH_1	76	MUX4_CH_1	126	MUX6_CH_1	176	MUX8_CH_1
27	MUX2_CH_2	77	MUX4_CH_2	127	MUX6_CH_2	177	MUX8_CH_2
28	MUX2_CH_3	78	MUX4_CH_3	128	MUX6_CH_3	178	MUX8_CH_3
29	MUX2_CH_4	79	MUX4_CH_4	129	MUX6_CH_4	179	MUX8_CH_4
30	MUX2_CH_5	80	MUX4_CH_5	130	MUX6_CH_5	180	MUX8_CH_5
31	MUX2_CH_6	81	MUX4_CH_6	131	MUX6_CH_6	181	MUX8_CH_6
32	MUX2_CH_7	82	MUX4_CH_7	132	MUX6_CH_7	182	MUX8_CH_7
33	MUX2_CH_8	83	MUX4_CH_8	133	MUX6_CH_8	183	MUX8_CH_8
34	MUX2_CH_9	84	MUX4_CH_9	134	MUX6_CH_9	184	MUX8_CH_9
35	MUX2_CH_10	85	MUX4_CH_10	135	MUX6_CH_10	185	MUX8_CH_10
36	MUX2_CH_11	86	MUX4_CH_11	136	MUX6_CH_11	186	MUX8_CH_11
37	MUX2_CH_12	87	MUX4_CH_12	137	MUX6_CH_12	187	MUX8_CH_12
38	MUX2_(COM/GND)	88	MUX4_(COM/GND)	138	MUX6_(COM/GND)	188	MUX8_(COM/GND)
39	MUX2_CH_13	89	MUX4_CH_13	139	MUX6_CH_13	189	MUX8_CH_13
40	MUX2_CH_14	90	MUX4_CH_14	140	MUX6_CH_14	190	MUX8_CH_14
41	MUX2_CH_15	91	MUX4_CH_15	141	MUX6_CH_15	191	MUX8_CH_15
42	MUX2_CH_16	92	MUX4_CH_16	142	MUX6_CH_16	192	MUX8_CH_16
43	MUX2_CH_17	93	MUX4_CH_17	143	MUX6_CH_17	193	MUX8_CH_17
44	MUX2_CH_18	94	MUX4_CH_18	144	MUX6_CH_18	194	MUX8_CH_18
45	MUX2_CH_19	95	MUX4_CH_19	145	MUX6_CH_19	195	MUX8_CH_19
46	MUX2_CH_20	96	MUX4_CH_20	146	MUX6_CH_20	196	MUX8_CH_20
47	MUX2_CH_21	97	MUX4_CH_21	147	MUX6_CH_21	197	MUX8_CH_21
48	MUX2_CH_22	98	MUX4_CH_22	148	MUX6_CH_22	198	MUX8_CH_22
49	MUX2_CH_23	99	MUX4_CH_23	149	MUX6_CH_23	199	MUX8_CH_23
50	MUX2_CH_24	100	MUX4_CH_24	150	MUX6_CH_24	200	MUX8_CH_24

TABLE 4-22: EX1200-3824 MUX CARD 200PIN CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

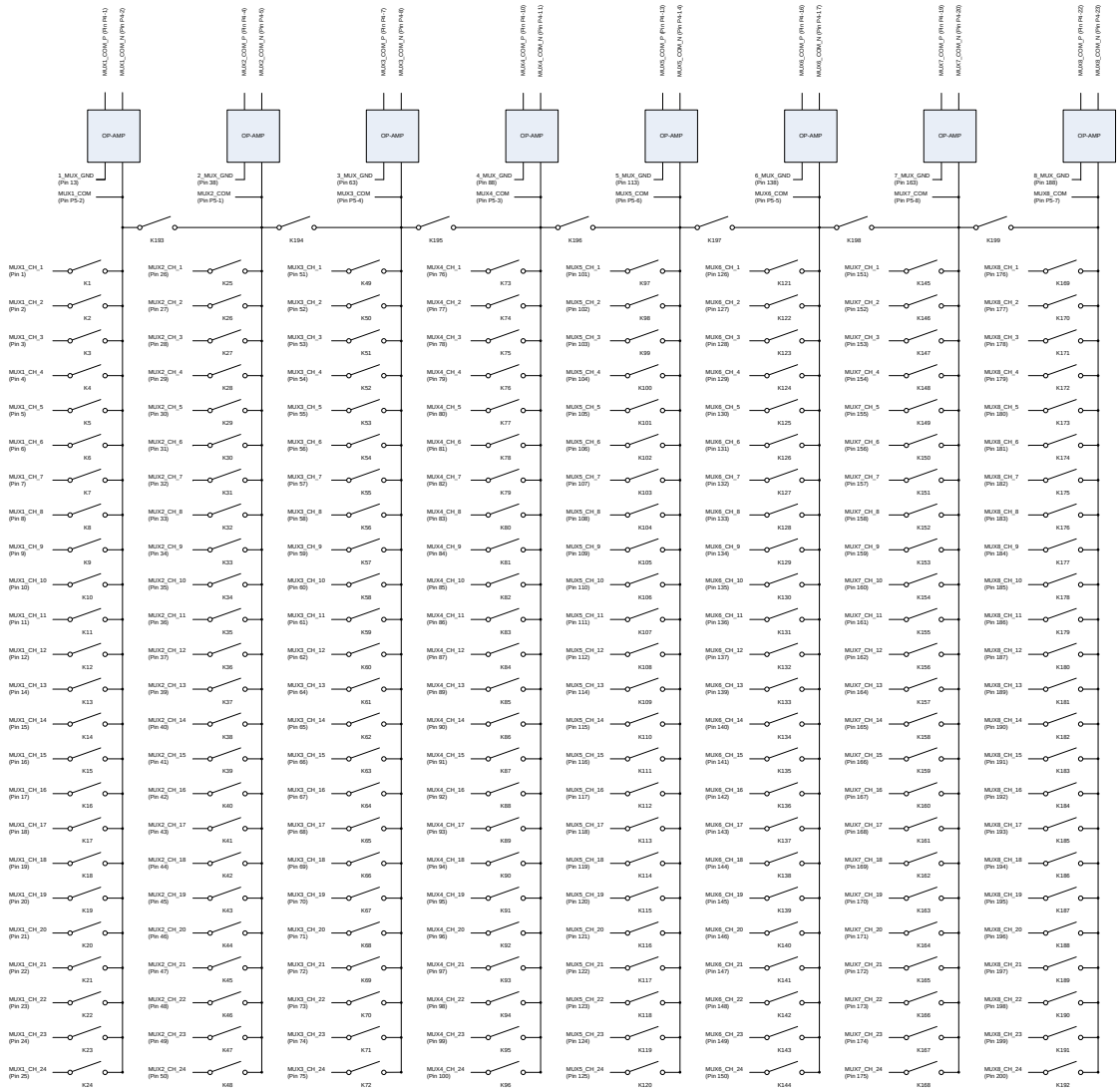


FIGURE 4-29: EX1200-3824 LOGICAL DIAGRAM

24 Pin Connector Pinout	
1	**MUX1_COM_P**
2	**MUX1_COM_N**
3	GND_A
4	**MUX2_COM_P**
5	**MUX2_COM_N**
6	GND_A
7	**MUX3_COM_P**
8	**MUX3_COM_N**
9	GND_A
10	**MUX4_COM_P**
11	**MUX4_COM_N**
12	GND_A
13	**MUX5_COM_P**
14	**MUX5_COM_N**
15	GND_A
16	**MUX6_COM_P**
17	**MUX6_COM_N**
18	GND_A
19	**MUX7_COM_P**
20	**MUX7_COM_N**
21	GND_A
22	**MUX8_COM_P**
23	**MUX8_COM_N**
24	GND_A

TABLE 4-23: EX1200-3824 ATTENUATOR OUTPUT 24 PIN MAPPING AND EX1200-38TB P10&P11 PIN MAPPING

EX1200-38TB

EX1200-38TB is the terminal box that can be used with EX1200-3824, it gets mounted on the front panel connecting to the 200 pin connector on the EX1200-3824 Board. The 8 Banks of 1x24 can be accessed on the 8 Nos of 50 Pin connectors on the EX1200-38TB. The 24 Pin connector on the EX1200-3824 for the Attenuator Output can also be brought out 1:1 using a 24 pin Female-Female IDC Cable. For Pinouts of P2-P9 please refer to Table 4-26, for P10&P11 Pinouts refer to Table 4-23.

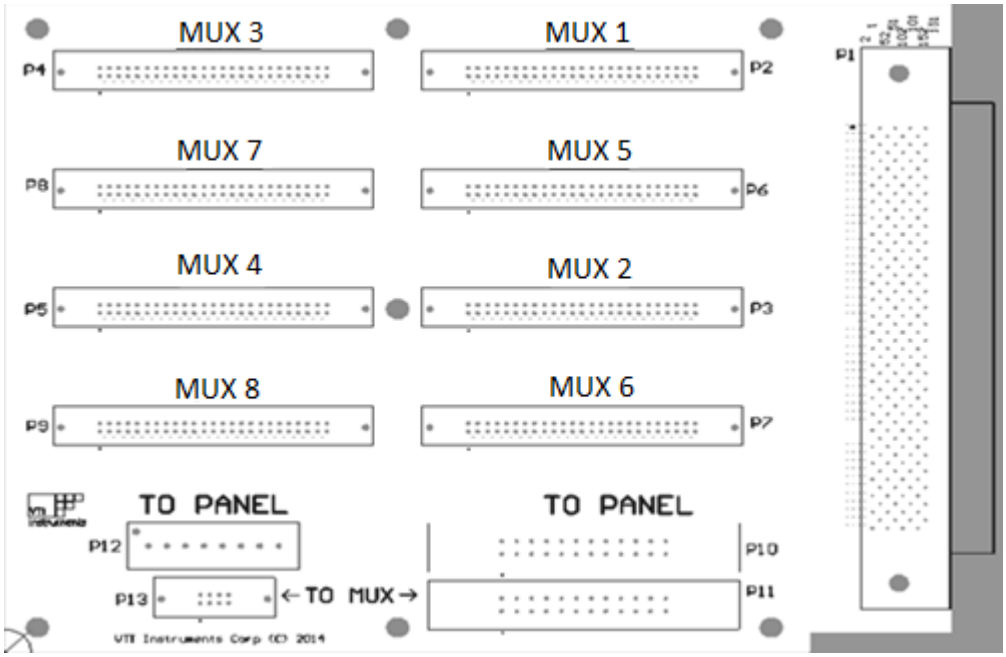


FIGURE 4-30: EX1200-38TB TERMINAL BOARD FOR EX1200-3824

P12 - 8 Pin Connector Pinouts	
1	MUX1_COM
2	MUX 2_COM
3	MUX 3_COM
4	MUX 4_COM
5	MUX 5_COM
6	MUX 6_COM
7	MUX 7_COM
8	MUX 8_COM

TABLE 4-24: EX1200-38TB P12 PINOUTS

P13 - 8 Pin Connector Pinouts	
1	MUX2_COM
2	MUX1_COM
3	MUX4_COM
4	MUX3_COM
5	MUX6_COM
6	MUX5_COM
7	MUX8_COM
8	MUX7_COM

TABLE 4-25: EX1200-38TB P13 PINOUTS

P2-P9 50 PIN CONNECTOR PINOUTS on EX1200-38TB								
PIN	**P2**	P3	**P4**	P5	**P6**	P7	**P8**	**P9**
1	MUX1_CH_24	MUX2_CH_24	MUX3_CH_24	MUX4_CH_24	MUX5_CH_24	MUX6_CH_24	MUX7_CH_24	MUX8_CH_24
2	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
3	MUX1_CH_23	MUX2_CH_23	MUX3_CH_23	MUX4_CH_23	MUX5_CH_23	MUX6_CH_23	MUX7_CH_23	MUX8_CH_23
4	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
5	MUX1_CH_22	MUX2_CH_22	MUX3_CH_22	MUX4_CH_22	MUX5_CH_22	MUX6_CH_22	MUX7_CH_22	MUX8_CH_22
6	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
7	MUX1_CH_21	MUX2_CH_21	MUX3_CH_21	MUX4_CH_21	MUX5_CH_21	MUX6_CH_21	MUX7_CH_21	MUX8_CH_21
8	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
9	MUX1_CH_20	MUX2_CH_20	MUX3_CH_20	MUX4_CH_20	MUX5_CH_20	MUX6_CH_20	MUX7_CH_20	MUX8_CH_20
10	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
11	MUX1_CH_19	MUX2_CH_19	MUX3_CH_19	MUX4_CH_19	MUX5_CH_19	MUX6_CH_19	MUX7_CH_19	MUX8_CH_19
12	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
13	MUX1_CH_18	MUX2_CH_18	MUX3_CH_18	MUX4_CH_18	MUX5_CH_18	MUX6_CH_18	MUX7_CH_18	MUX8_CH_18
14	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND

15	MUX1_CH_17	MUX2_CH_17	MUX3_CH_17	MUX4_CH_17	MUX5_CH_17	MUX6_CH_17	MUX7_CH_17	MUX8_CH_17
16	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
17	MUX1_CH_16	MUX2_CH_16	MUX3_CH_16	MUX4_CH_16	MUX5_CH_16	MUX6_CH_16	MUX7_CH_16	MUX8_CH_16
18	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
19	MUX1_CH_15	MUX2_CH_15	MUX3_CH_15	MUX4_CH_15	MUX5_CH_15	MUX6_CH_15	MUX7_CH_15	MUX8_CH_15
20	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
21	MUX1_CH_14	MUX2_CH_14	MUX3_CH_14	MUX4_CH_14	MUX5_CH_14	MUX6_CH_14	MUX7_CH_14	MUX8_CH_14
22	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
23	MUX1_CH_13	MUX2_CH_13	MUX3_CH_13	MUX4_CH_13	MUX5_CH_13	MUX6_CH_13	MUX7_CH_13	MUX8_CH_13
24	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
25	MUX1_CH_12	MUX2_CH_12	MUX3_CH_12	MUX4_CH_12	MUX5_CH_12	MUX6_CH_12	MUX7_CH_12	MUX8_CH_12
26	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
27	MUX1_CH_11	MUX2_CH_11	MUX3_CH_11	MUX4_CH_11	MUX5_CH_11	MUX6_CH_11	MUX7_CH_11	MUX8_CH_11
28	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
29	MUX1_CH_10	MUX2_CH_10	MUX3_CH_10	MUX4_CH_10	MUX5_CH_10	MUX6_CH_10	MUX7_CH_10	MUX8_CH_10
30	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
31	MUX1_CH_9	MUX2_CH_9	MUX3_CH_9	MUX4_CH_9	MUX5_CH_9	MUX6_CH_9	MUX7_CH_9	MUX8_CH_9
32	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
33	MUX1_CH_8	MUX2_CH_8	MUX3_CH_8	MUX4_CH_8	MUX5_CH_8	MUX6_CH_8	MUX7_CH_8	MUX8_CH_8
34	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
35	MUX1_CH_7	MUX2_CH_7	MUX3_CH_7	MUX4_CH_7	MUX5_CH_7	MUX6_CH_7	MUX7_CH_7	MUX8_CH_7
36	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
37	MUX1_CH_6	MUX2_CH_6	MUX3_CH_6	MUX4_CH_6	MUX5_CH_6	MUX6_CH_6	MUX7_CH_6	MUX8_CH_6
38	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
39	MUX1_CH_5	MUX2_CH_5	MUX3_CH_5	MUX4_CH_5	MUX5_CH_5	MUX6_CH_5	MUX7_CH_5	MUX8_CH_5
40	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
41	MUX1_CH_4	MUX2_CH_4	MUX3_CH_4	MUX4_CH_4	MUX5_CH_4	MUX6_CH_4	MUX7_CH_4	MUX8_CH_4
42	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
43	MUX1_CH_3	MUX2_CH_3	MUX3_CH_3	MUX4_CH_3	MUX5_CH_3	MUX6_CH_3	MUX7_CH_3	MUX8_CH_3
44	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
45	MUX1_CH_2	MUX2_CH_2	MUX3_CH_2	MUX4_CH_2	MUX5_CH_2	MUX6_CH_2	MUX7_CH_2	MUX8_CH_2
46	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
47	MUX1_CH_1	MUX2_CH_1	MUX3_CH_1	MUX4_CH_1	MUX5_CH_1	MUX6_CH_1	MUX7_CH_1	MUX8_CH_1
48	MUX1_GND	MUX2_GND	MUX3_GND	MUX4_GND	MUX5_GND	MUX6_GND	MUX7_GND	MUX8_GND
49	NC	NC	NC	NC	NC	NC	NC	NC
50	NC	NC	NC	NC	NC	NC	NC	NC

TABLE 4-26: EX1200-38TB P2-P9 PINOUTS

EX1200-3824 SPECIFICATIONS

SPECIFICATIONS FOR EX1200-3824 STANDARD BOARD	
CHANNEL COUNT	
	8 (1x24) one-wire multiplexers
RELAY TYPE	
	Solid State
MAXIMUM SWITCHING VOLTAGE	
	70V DC 100V AC
MAXIMUM SWITCHING CURRENT	
	100mA
SWITCHING TIME	
	< 500µs
PATH RESISTANCE	
	<10 Ohms
CROSSTALK (TYPICAL)	
100 KHz	<-70 dB
1 MHz	< -55 dB
10 MHz	< -30 dB
INSERTION LOSS (-3 DB)	
	>25 MHz

SPECIFICATIONS FOR EX1200-3824 WITH ATTENUATOR OPTION	
CHANNEL COUNT	
	8 (1x24) one-wire multiplexers
RELAY TYPE	
	Solid State
MAXIMUM SWITCHING VOLTAGE	
	70V DC 100V AC
MAXIMUM SWITCHING CURRENT	
	100mA
SWITCHING TIME	
	< 500µs
PATH RESISTANCE	
	<10 Ohms
FREQUENCY RESPONSE -CUTOFF	
10kHz	-3dB
400kHz	-3dB
FREQUENCY RESPONSE -FLATNESS	
10kHz	0.1dB
400kHz	0.1dB
CROSSTALK (TYPICAL)	
10kHz	<-40dB
400kHz	< -30dB
CMRR – 400kHz	
	-30dB
DC OFFSET	
	1mV

EX1200-4003 PLUG-IN MODULE

DUAL 4 X 16 TWO-WIRE MATRIX, 300 V / 2 A

The EX1200-4003 high-density matrix module allow the user to connect any input row to any output column, with a DPST relay at every row/column cross point. This architecture provides the framework for flexible switch system designs where multiple test instruments need to be connected to common test points. For example, a digital multimeter, counter/timer and digitizers can be connected to the input rows, and each of these devices can be connected to any of the output columns depending on the measurement function that is desired during the test. The connections between rows and columns occur internal to the module which greatly reduces external cabling.

The smallest building block is a (4 x 16) 2-wire matrix, and rows and columns can easily be expanded to form larger matrices. A (4 x 192) 2-wire matrix can be accommodated in an EX1200 series full rack mainframe. The two banks of matrices can be connected under program control to further simplify field wiring.

Fail-safe relays capable of switching up to 300 V and up to 2 A are used to maximize the range of application spaces that can be addressed with this module. All relays are fail-safe which ensures that no undesired signals are present at the user interface in the case of power interruption.

The EX1200-4003 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4- provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available.

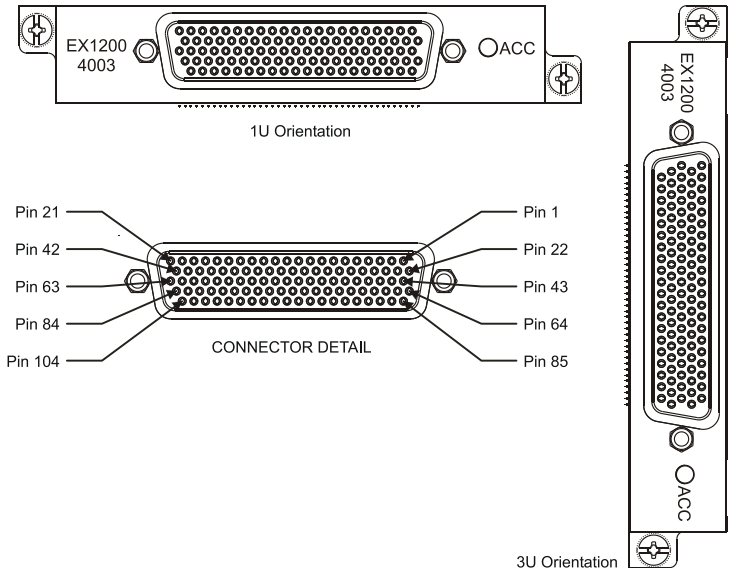


FIGURE 4-31: EX1200-4003 FRONT PANEL (FRONT VIEW)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	CH1_C6H	22	CH1_C13L	43	CH1_C14L	64	CH1_C7H	85	CH1_C15H
2	CH1_C6L	23	CH1_C13H	44	CH1_C14H	65	CH1_C7L	86	CH1_C15L
3	CH1_C12H	24	CH1_C16L	45	CH1_C5L	66	CH1_R2H	87	CH1_R1L
4	CH1_C12L	25	CH1_C16H	46	CH1_C5H	67	CH1_R2L	88	CH1_R1H
5	CH1_C4H	26	CH1_C11L	47	SHIELD	68	SHIELD	89	CH1_R3H
6	CH1_C4L	27	CH1_C11H	48	SHIELD	69	SHIELD	90	CH1_R3L
7	CH1_C9H	28	CH1_R4H	49	SHIELD	70	CH1_C3L	91	SHIELD
8	CH1_C9L	29	CH1_R4L	50	SHIELD	71	CH1_C3H	92	SHIELD
9	CH1_C1L	30	CH1_C10H	51	CH2_C19L	72	CH1_C2L	93	SHIELD
10	CH1_C1H	31	CH1_C10L	52	CH2_C19H	73	CH1_C2H	94	SHIELD
11	CH1_C8L	32	CH2_C20H	53	SHIELD	74	CH2_C17L	95	SHIELD
12	CH1_C8H	33	CH2_C20L	54	SHIELD	75	CH2_C17H	96	SHIELD
13	CH2_C21L	34	CH2_C32H	55	SHIELD	76	CH2_R5H	97	SHIELD
14	CH2_C21H	35	CH2_C32L	56	SHIELD	77	CH2_R5L	98	SHIELD
15	CH2_C31H	36	SHIELD	57	CH2_C22H	78	CH2_R6H	99	CH2_R8L
16	CH2_C31L	37	SHIELD	58	CH2_C22L	79	CH2_R6L	100	CH2_R8H
17	CH2_C23L	38	CH2_C30L	59	CH2_C18L	80	CH2_R7L	101	CH2_C25H
18	CH2_C23H	39	CH2_C30H	60	CH2_C18H	81	CH2_R7H	102	CH2_C25L
19	CH2_C29H	40	CH2_C24H	61	CH2_C28L	82	CH2_C27L	103	CH2_C26H
20	CH2_C29L	41	CH2_C24L	62	CH2_C28H	83	CH2_C27H	104	CH2_C26L
21	SHIELD	42	SHIELD	63	UNUSED	84	UNUSED		

TABLE 4-27: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-4003 incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-. Note that SHIELD pins are not tied to ground and have no electrical connections.

LOGICAL DIAGRAM

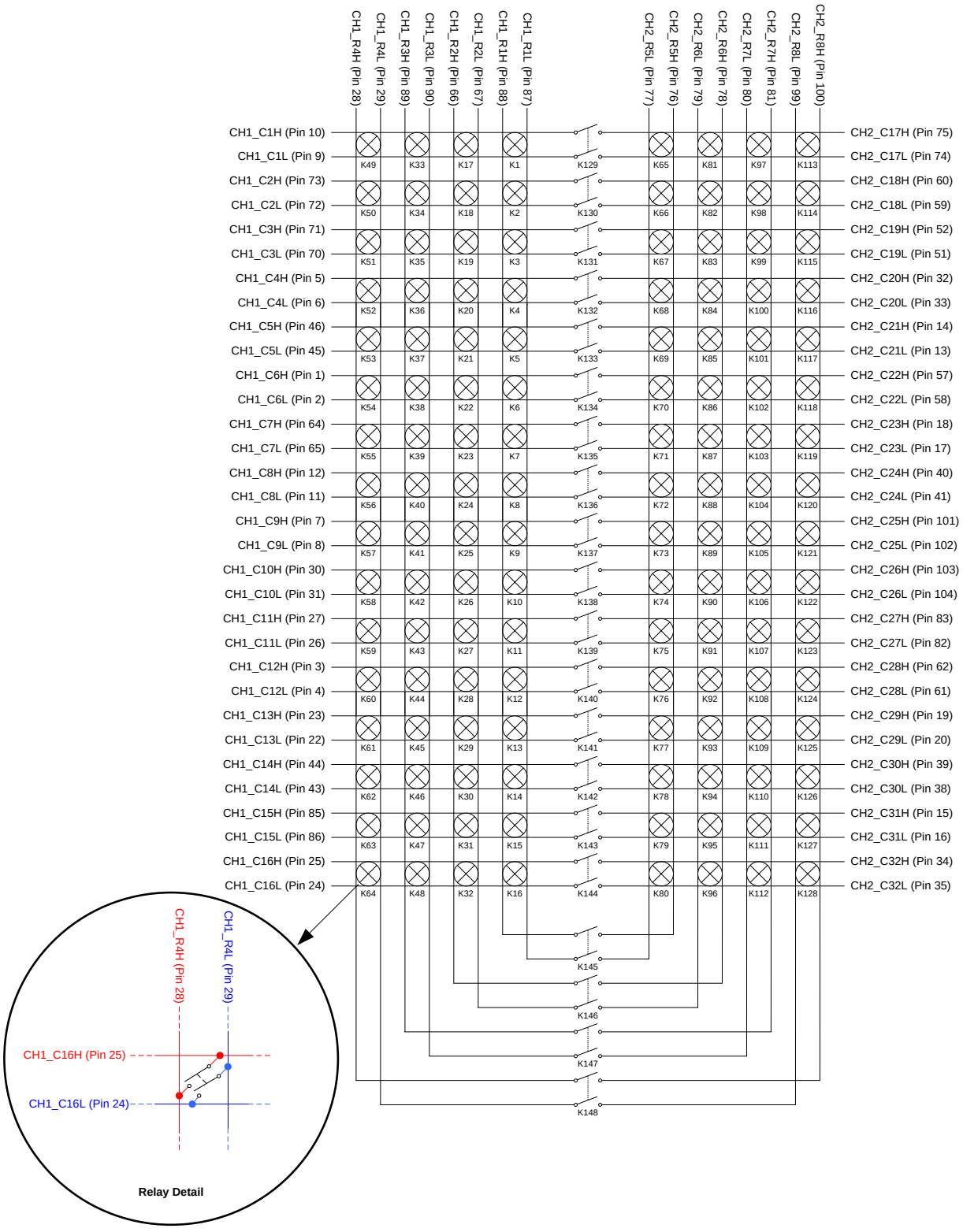

CH1_R4H (Pin 28)
CH1_R4L (Pin 29)
CH1_R3H (Pin 89)
CH1_R3L (Pin 90)
CH1_R2H (Pin 66)
CH1_R2L (Pin 67)
CH1_R1H (Pin 88)
CH1_R1L (Pin 87)
CH2_R5L (Pin 77)
CH2_R5H (Pin 76)
CH2_R6L (Pin 79)
CH2_R6H (Pin 78)
CH2_R7L (Pin 80)
CH2_R7H (Pin 81)
CH2_R8L (Pin 99)
CH2_R8H (Pin 100)
CH1_C1H (Pin 10)
CH1_C1L (Pin 9)
CH1_C2H (Pin 73)
CH1_C2L (Pin 72)
CH1_C3H (Pin 71)
CH1_C3L (Pin 70)
CH1_C4H (Pin 5)
CH1_C4L (Pin 6)
CH1_C5H (Pin 46)
CH1_C5L (Pin 45)
CH1_C6H (Pin 1)
CH1_C6L (Pin 2)
CH1_C7H (Pin 64)
CH1_C7L (Pin 65)
CH1_C8H (Pin 12)
CH1_C8L (Pin 11)
CH1_C9H (Pin 7)
CH1_C9L (Pin 8)
CH1_C10H (Pin 30)
CH1_C10L (Pin 31)
CH1_C11H (Pin 27)
CH1_C11L (Pin 26)
CH1_C12H (Pin 3)
CH1_C12L (Pin 4)
CH1_C13H (Pin 23)
CH1_C13L (Pin 22)
CH1_C14H (Pin 44)
CH1_C14L (Pin 43)
CH1_C15H (Pin 85)
CH1_C15L (Pin 86)
CH1_C16H (Pin 25)
CH1_C16L (Pin 24)
CH2_C17H (Pin 75)
CH2_C17L (Pin 74)
CH2_C18H (Pin 60)
CH2_C18L (Pin 59)
CH2_C19H (Pin 52)
CH2_C19L (Pin 51)
CH2_C20H (Pin 32)
CH2_C20L (Pin 33)
CH2_C21H (Pin 14)
CH2_C21L (Pin 13)
CH2_C22H (Pin 57)
CH2_C22L (Pin 58)
CH2_C23H (Pin 18)
CH2_C23L (Pin 17)
CH2_C24H (Pin 40)
CH2_C24L (Pin 41)
CH2_C25H (Pin 101)
CH2_C25L (Pin 102)
CH2_C26H (Pin 103)
CH2_C26L (Pin 104)
CH2_C27H (Pin 83)
CH2_C27L (Pin 82)
CH2_C28H (Pin 62)
CH2_C28L (Pin 61)
CH2_C29H (Pin 19)
CH2_C29L (Pin 20)
CH2_C30H (Pin 39)
CH2_C30L (Pin 38)
CH2_C31H (Pin 15)
CH2_C31L (Pin 16)
CH2_C32H (Pin 34)
CH2_C32L (Pin 35)
K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14 K15 K16
K17 K18 K19 K20 K21 K22 K23 K24 K25 K26 K27 K28 K29 K30 K31 K32
K33 K34 K35 K36 K37 K38 K39 K40 K41 K42 K43 K44 K45 K46 K47 K48
K49 K50 K51 K52 K53 K54 K55 K56 K57 K58 K59 K60 K61 K62 K63 K64
K65 K66 K67 K68 K69 K70 K71 K72 K73 K74 K75 K76 K77 K78 K79 K80
K81 K82 K83 K84 K85 K86 K87 K88 K89 K90 K91 K92 K93 K94 K95 K96
K97 K98 K99 K100 K101 K102 K103 K104 K105 K106 K107 K108 K109 K110 K111 K112
K113 K114 K115 K116 K117 K118 K119 K120 K121 K122 K123 K124 K125 K126 K127 K128
K129 K130 K131 K132 K133 K134 K135 K136 K137 K138 K139 K140 K141 K142 K143 K144
K145 K146 K147 K148
CH1_R4H (Pin 28)
CH1_R4L (Pin 29)
CH1_C16H (Pin 25)
CH1_C16L (Pin 24)
Relay Detail

FIGURE 4-32: EX1200-4003 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH1_C6H	1	T31	CH1_C10H	30	T61	CH2_C18L	59	T91	CH2_C27L	82
T2	CH1_C6L	2	T32	CH1_C10L	31	T62	CH2_C18H	60	T92	CH2_C27H	83
T3	CH1_C12H	3	T33	CH2_C20H	32	T63	CH2_C28L	61	T93	UNUSED	N/A
T4	CH1_C12L	4	T34	CH2_C20L	33	T64	CH2_C28H	62	T94	GND_C	84
T5	CH1_C4H	5	T35	CH2_C32H	34	T65	UNUSED	N/A	T95	CH1_C15H	85
T6	CH1_C4L	6	T36	CH2_C32L	35	T66	GND_C	63	T96	CH1_C15L	86
T7	CH1_C9L	7	T37	SHIELD	36	T67	CH1_C7H	64	T97	CH1_R1L	87
T8	CH1_C9H	8	T38	SHIELD	37	T68	CH1_C7L	65	T98	CH1_R1H	88
T9	CH1_C1L	9	T39	CH2_C30L	38	T69	CH1_R2H	66	T99	CH1_R3H	89
T10	CH1_C1H	10	T40	CH2_C30H	39	T70	CH1_R2L	67	T100	CH1_R3L	90
T11	CH1_C8L	11	T41	CH2_C24H	40	T71	SHIELD	68	T101	SHIELD	91
T12	CH1_C8H	12	T42	CH2_C24L	41	T72	SHIELD	69	T102	SHIELD	92
T13	CH2_C21L	13	T43	UNUSED	N/A	T73	CH1_C3L	70	T103	SHIELD	93
T14	CH2_C21H	14	T44	SHIELD	42	T74	CH1_C3H	71	T104	SHIELD	94
T15	CH2_C31H	15	T45	CH1_C14L	43	T75	UNUSED	N/A	T105	SHIELD	95
T16	CH2_C31L	16	T46	CH1_C14H	44	T76	UNUSED	N/A	T106	SHIELD	96
T17	CH2_C23L	17	T47	CH1_C5L	45	T77	UNUSED	N/A	T107	SHIELD	97
T18	CH2_C23H	18	T48	CH1_C5H	46	T78	UNUSED	N/A	T108	SHIELD	98
T19	CH2_C29H	19	T49	SHIELD	47	T79	UNUSED	N/A	T109	CH2_R8L	99
T20	CH2_C29L	20	T50	SHIELD	48	T80	UNUSED	N/A	T110	CH2_R8H	100
T21	UNUSED	N/A	T51	SHIELD	49	T81	CH1_C2L	72	T111	CH2_C25H	101
T22	SHIELD	21	T52	SHIELD	50	T82	CH1_C2H	73	T112	CH2_C25L	102
T23	CH1_C13L	22	T53	CH2_C19H	51	T83	CH2_C17L	74	T113	CH2_C26H	103
T24	CH1_C13H	23	T54	CH2_C19L	52	T84	CH2_C17H	75	T114	CH2_C26L	104
T25	CH1_C16L	24	T55	SHIELD	53	T85	CH2_R5H	76	T155	UNUSED	N/A
T26	CH1_C16H	25	T56	SHIELD	54	T86	CH2_R5L	77	T156	UNUSED	N/A
T27	CH1_C11L	26	T57	SHIELD	55	T87	CH2_R6H	78	T157	UNUSED	N/A
T28	CH1_C11H	27	T58	SHIELD	56	T88	CH2_R6L	79	T158	UNUSED	N/A
T29	CH1_R4H	28	T59	CH2_C22H	57	T89	CH2_R7L	80	T159	UNUSED	N/A
T30	CH1_R4L	29	T60	CH2_C22L	58	T90	CH2_R7H	81	T160	UNUSED	N/A

TABLE 4-28: EX1200-TB104 TERMINAL BLOCK TO EX1200-4003 PIN MAPPING

The EX1200-4003 terminal block is a special case switch where, although the terminal block has a thermistor, it does not have access to the DMM backplane and cannot use the internal EX1200 DMM. RT1 can still be measured, though, with an external instrument. Connect the instrument to T163 (L_VS) and T164 (H_VS) and then remove the jumper on pins 3 and 4 of P2.

EX1200-4003 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Configurable as dual (4 x 16), or single (8 x 16) two-wire matrices
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V dc, 250 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 62.5 VA
RATED SWITCH OPERATIONS	
Mechanical	1×10^8
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 500 mΩ
INSULATION RESISTANCE	
	> 1×10^9 Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 10 µV
BANDWIDTH (-3 dB)	
	45 MHz (typical, 4 x 16 configuration)
CAPACITANCE	
Open channel	< 90 pF
Channel-mainframe	< 390 pF
High-low	< 170 pF
CROSSTALK (TYPICAL)	
1 MHz	< -55 dB
10 MHz	< -45 dB
ISOLATION (TYPICAL)	
1 MHz	< -60 dB
10 MHz	< -50 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-4128 PLUG-IN MODULE

4 X 128 ONE-WIRE MATRIX, 150 V/0.5 A

The EX1200-4128 is an ultra high-density matrix module that allows the user to connect any input row to any output column, with an SPST relay at every row/column cross-point. This architecture provides the framework for flexible switch system designs where multiple test instruments need to be connected to common test points. The one-wire architecture allows for any of the 128 row inputs to be connected to any of the four column outputs.

The four output columns can be routed to the EX1200 series internal analog backplane to build large matrices, or to connect to the optional 6.5 digit DMM, which also limits the amount of external cabling required. A (4 x 512) 1-wire matrix can be accommodated in only four slots of an EX1200 series mainframe, as an example.

Stub-breaking relays can remove a matrix module from the backplane to increase signal integrity of measurements being made on other modules. All relays are fail-safe which ensures that no undesired signals are present at the user interface in the case of power interruption.

The EX1200-4128 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-34 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

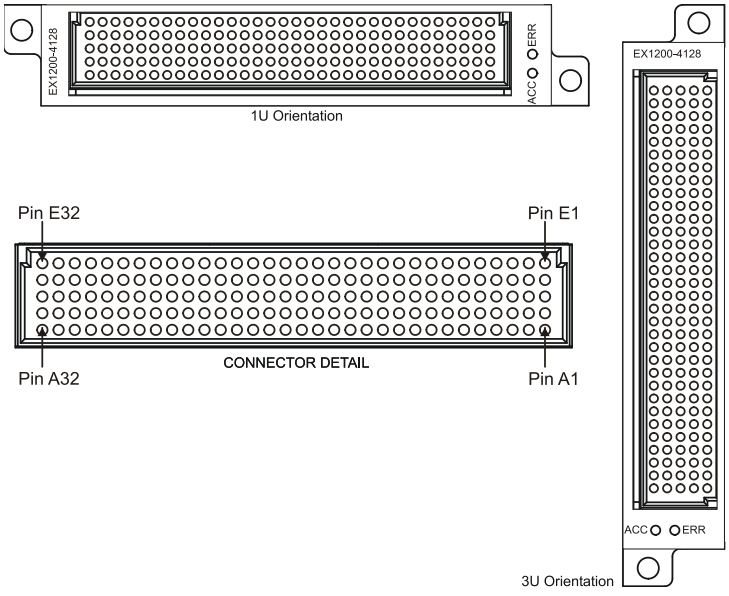


FIGURE 4-33: EX1200-4128 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH_C1	**1**	CH_C3	**1**	CH_R1	**1**	CH_R2	**1**	CH_R3
2	CH_C2	**2**	CH_C4	**2**	UNUSED	**2**	CH_R4	**2**	CH_R5
3	UNUSED	**3**	CH_R61	**3**	CH_R62	**3**	CH_R6	**3**	CH_R7
4	CH_R63	**4**	CH_R64	**4**	CH_R65	**4**	CH_R8	**4**	CH_R9
5	CH_R66	**5**	CH_R67	**5**	CH_R68	**5**	CH_R10	**5**	CH_R11
6	CH_R69	**6**	CH_R70	**6**	CH_R71	**6**	CH_R12	**6**	CH_R13
7	CH_R72	**7**	CH_R73	**7**	CH_R74	**7**	CH_R14	**7**	CH_R15
8	CH_R75	**8**	CH_R76	**8**	CH_R77	**8**	CH_R16	**8**	CH_R17
9	CH_R78	**9**	CH_R79	**9**	CH_R80	**9**	CH_R18	**9**	CH_R19
10	CH_R81	**10**	CH_R82	**10**	CH_R83	**10**	CH_R20	**10**	CH_R21
11	CH_R84	**11**	CH_R85	**11**	CH_R86	**11**	CH_R22	**11**	CH_R23
12	CH_R87	**12**	CH_R88	**12**	CH_R89	**12**	CH_R24	**12**	CH_R25
13	CH_R90	**13**	CH_R91	**13**	CH_R92	**13**	CH_R26	**13**	CH_R27
14	CH_R93	**14**	CH_R94	**14**	CH_R95	**14**	CH_R28	**14**	CH_R29
15	CH_R96	**15**	CH_R97	**15**	CH_R98	**15**	CH_R30	**15**	CH_R31
16	SHIELD	**16**	SHIELD	**16**	SHIELD	**16**	CH_R32	**16**	CH_R33
17	SHIELD	**17**	SHIELD	**17**	SHIELD	**17**	CH_R34	**17**	UNUSED
18	CH_R99	**18**	CH_R100	**18**	SHIELD	**18**	UNUSED	**18**	UNUSED
19	CH_R102	**19**	CH_R103	**19**	CH_R101	**19**	CH_R35	**19**	CH_R36
20	CH_R105	**20**	CH_R106	**20**	CH_R104	**20**	CH_R37	**20**	CH_R38
21	CH_R108	**21**	CH_R109	**21**	CH_R107	**21**	CH_R39	**21**	CH_R40
22	CH_R111	**22**	CH_R112	**22**	CH_R110	**22**	CH_R41	**22**	CH_R42
23	CH_R114	**23**	CH_R115	**23**	CH_R113	**23**	CH_R43	**23**	CH_R44
24	CH_R117	**24**	CH_R118	**24**	CH_R116	**24**	CH_R45	**24**	CH_R46
25	UNUSED	**25**	UNUSED	**25**	CH_R119	**25**	CH_R47	**25**	CH_R48
26	CH_R120	**26**	CH_R121	**26**	CH_R122	**26**	CH_R49	**26**	CH_R50
27	CH_R123	**27**	CH_R124	**27**	CH_R125	**27**	CH_R51	**27**	UNUSED
28	CH_R126	**28**	CH_R127	**28**	CH_R128	**28**	UNUSED	**28**	UNUSED
29	UNUSED	**29**	UNUSED	**29**	CH_R52	**29**	CH_R59	**29**	CH_R60
30	GND_C	**30**	SHIELD	**30**	UNUSED	**30**	CH_R57	**30**	CH_R58
31	GND_C	**31**	SHIELD	**31**	GND_C	**31**	CH_R55	**31**	CH_R56
32	GND_C	**32**	SHIELD	**32**	GND_C	**32**	CH_R53	**32**	CH_R54

TABLE 4-29: 1-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-4128 incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-9.

The module also incorporates ground pins, labeled "GND_C" above. These pins tie the module to chassis ground. Note that the SHIELD pins are not tied to ground and have no electrical connections.

Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal
D5	H	CH1_2W	E16	H	CH17_2W	C4	H	CH33_2W	B15	H	CH49_2W
D1	L		D17	L		A5	L		C15	L	
E1	H	CH2_2W	D19	H	CH18_2W	B5	H	CH34_2W	A18	H	CH50_2W
D2	L		E19	L		C5	L		B18	L	
E2	H	CH3_2W	D20	H	CH19_2W	A6	H	CH35_2W	C19	H	CH51_2W
D3	L		E20	L		B6	L		A19	L	
A8	H	CH4_2W	D21	H	CH20_2W	C6	H	CH36_2W	B19	H	CH52_2W
C9	L		E21	L		A7	L		C20	L	
E4	H	CH5_2W	D22	H	CH21_2W	B7	H	CH37_2W	A20	H	CH53_2W
D5	L		E22	L		C7	L		B20	L	
E5	H	CH6_2W	D23	H	CH22_2W	A8	H	CH38_2W	C21	H	CH54_2W
D6	L		E23	L		B8	L		A21	L	
E6	H	CH7_2W	D24	H	CH23_2W	C8	H	CH39_2W	B21	H	CH55_2W
D7	L		E24	L		A9	L		C22	L	
E7	H	CH8_2W	D25	H	CH24_2W	B9	H	CH40_2W	A22	H	CH56_2W
D8	L		E25	L		C9	L		B22	L	
E8	H	CH9_2W	D26	H	CH25_2W	A10	H	CH41_2W	C23	H	CH57_2W
D9	L		E26	L		B10	L		A23	L	
E9	H	CH10_2W	D27	H	CH26_2W	C10	H	CH42_2W	B23	H	CH58_2W
D10	L		C29	L		A11	L		C24	L	
E10	H	CH11_2W	D32	H	CH27_2W	B11	H	CH43_2W	A24	H	CH59_2W
D11	L		E32	L		C11	L		B24	L	
E11	H	CH12_2W	D31	H	CH28_2W	A12	H	CH44_2W	C25	H	CH60_2W
D12	L		E31	L		B12	L		A26	L	
E12	H	CH13_2W	D30	H	CH29_2W	C12	H	CH45_2W	B26	H	CH61_2W
D13	L		E30	L		A13	L		C26	L	
E13	H	CH14_2W	D29	H	CH30_2W	B13	H	CH46_2W	A27	H	CH62_2W
D14	L		E29	L		C13	L		B27	L	
E14	H	CH15_2W	B3	H	CH31_2W	A14	H	CH47_2W	C27	H	CH63_2W
D15	L		C3	L		B14	L		A28	L	
E15	H	CH16_2W	A4	H	CH32_2W	C14	H	CH48_2W	B28	H	CH64_2W
D16	L		B4	L		A15	L		C28	L	

2-Wire Common and Backplane Signal Names

Pin/DMM Bus Line	H/L	Signal	Pin/DMM Bus Line	H/L	Signal
A2	H	CH1_2WCOM	B2	H	CH2_2WCOM
A1	L		B1	L	
BPL_HI	H	ACV	BPL_HI	H	DCV
BPL_LO	L		BPL_LO	L	
BPL_HI	H	2WOHM			
BPL_LO	L				

TABLE 4-30: 2-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

NOTES	The H/L column represents the "HI" and "LO" pins for the 2-wire signal. The "BPL" references are lines available on the EX1200 mainframe backplane that connect the plug-in module to the on-board DMM (if installed). For more information on these lines, refer to the *EX1200 Series User's Manual*.

Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal
D5	H1	CH1_4W	E16	H1	CH9_4W	C4	H1	CH17_4W	B15	H1	CH25_4W
D1	L1		D17	L1		A5	L1		C15	L1	
E1	H2		D19	H2		B5	H2		A18	H2	
D2	L2		E19	L2		C5	L2		B18	L2	
E2	H1	CH2_4W	D20	H1	CH10_4W	A6	H1	CH18_4W	C19	H1	CH26_4W
D3	L1		E20	L1		B6	L1		A19	L1	
A8	H2		D21	H2		C6	H2		B19	H2	
C9	L2		E21	L2		A7	L2		C20	L2	
E4	H1	CH3_4W	D22	H1	CH11_4W	B7	H1	CH19_4W	A20	H1	CH27_4W
D5	L1		E22	L1		C7	L1		B20	L1	
E5	H2		D23	H2		A8	H2		C21	H2	
D6	L2		E23	L2		B8	L2		A21	L2	
E6	H1	CH4_4W	D24	H1	CH12_4W	C8	H1	CH20_4W	B21	H1	CH28_4W
D7	L1		E24	L1		A9	L1		C22	L1	
E7	H2		D25	H2		B9	H2		A22	H2	
D8	L2		E25	L2		C9	L2		B22	L2	
E8	H1	CH5_4W	D26	H1	CH13_4W	A10	H1	CH21_4W	C23	H1	CH29_4W
D9	L1		E26	L1		B10	L1		A23	L1	
E9	H2		D27	H2		C10	H2		B23	H2	
D10	L2		C29	L2		A11	L2		C24	L2	
E10	H1	CH6_4W	D32	H1	CH14_4W	B11	H1	CH22_4W	A24	H1	CH30_4W
D11	L1		E32	L1		C11	L1		B24	L1	
E11	H2		D31	H2		A12	H2		C25	H2	
D12	L2		E31	L2		B12	L2		A26	L2	
E12	H1	CH7_4W	D30	H1	CH15_4W	C12	H1	CH23_4W	B26	H1	CH31_4W
D13	L1		E30	L1		A13	L1		C26	L1	
E13	H2		D29	H2		B13	H2		A27	H2	
D14	L2		E29	L2		C13	L2		B27	L2	
E14	H1	CH8_4W	B3	H1	CH16_4W	A14	H1	CH24_4W	C27	H1	CH32_4W
D15	L1		C3	L1		B14	L1		A28	L1	
E15	H2		A4	H2		C14	H2		B28	H2	
D16	L2		B4	L2		A15	L2		C28	L2	

4-Wire Common and Backplane Signal Names

Pin/DMM Bus Line	H/L	Signal	Pin/DMM Bus Line	H/L	Signal
A2	H1	CH_C	BPL_HI	H1	4WOHM
A1	L1		BPL_LO	L1	
B2	H2		BPL_SHI	H2	
B1	L2		BPL_SLO	L2	

TABLE 4-31: 4-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

NOTES The H/L column represents the "HI" and "LO" pins for the 4-wire signal.
The "BPL" references are lines available on the EX1200 mainframe backplane that connect the plug-in module to the on-board DMM (if installed). For more information on these lines, refer to the *EX1200 Series User's Manual*.

LOGICAL DIAGRAM

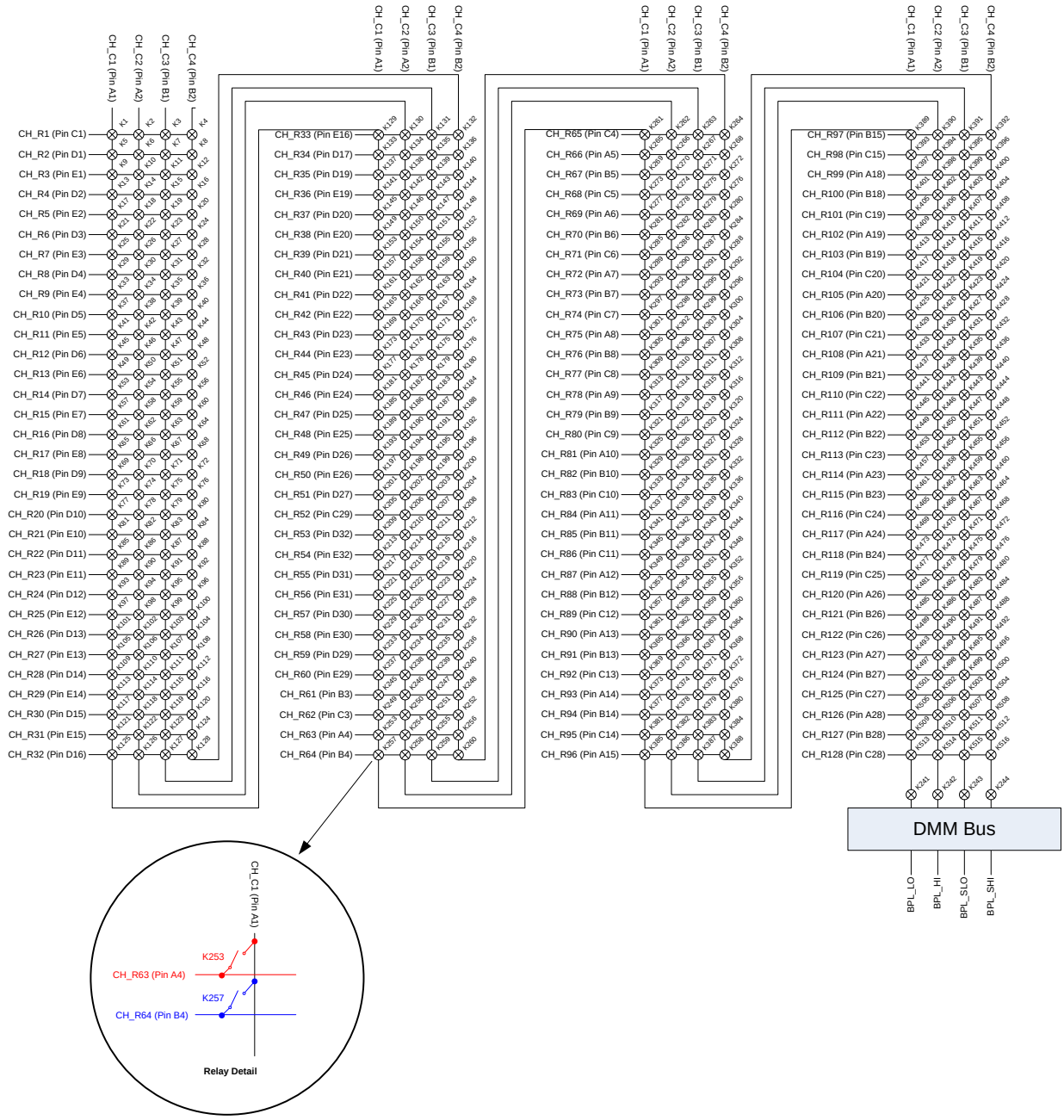


FIGURE 4-34: EX1200-4128 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH_R5	E2	T41	CH_R96	A15	T81	CH_R95	C14	T121	CH_R111	A22
T2	CH_R4	D2	T42	CH_R93	A14	T82	CH_R94	B14	T122	CH_R114	A23
T3	CH_R7	E3	T43	CH_R90	A13	T83	CH_R98	C15	T123	CH_R105	A20
T4	CH_R6	D3	T44	CH_R87	A12	T84	CH_R97	B15	T124	CH_R99	A18
T5	CH_R9	E4	T45	CH_R81	A10	T85	SHIELD	C16	T125	CH_R102	A19
T6	CH_R8	D4	T46	CH_R20	D10	T86	SHIELD	B16	T126	SHIELD	A16
T7	CH_R11	E5	T47	CH_R21	E10	T87	SHIELD	C17	T127	SHIELD	A17
T8	CH_R10	D5	T48	CH_R86	C11	T88	SHIELD	B17	T128	CH_R53	D32
T9	CH_R13	E6	T49	CH_R85	B11	T89	SHIELD	C18	T129	CH_R58	E30
T10	CH_R12	D6	T50	CH_R84	A11	T90	CH_R100	B18	T130	CH_R57	D30
T11	CH_R15	E7	T51	CH_R88	B12	T91	CH_R101	C19	T131	CH_R60	E29
T12	CH_R14	D7	T52	CH_R89	C12	T92	CH_R103	B19	T132	CH_R59	D29
T13	CH_R17	E8	T53	CH_R91	B13	T93	CH_R104	C20	T133	CH_R56	E31
T14	CH_R16	D8	T54	CH_R92	C13	T94	CH_R106	B20	T134	CH_R55	D31
T15	CH_R19	E9	T55	CH_R78	A9	T95	GND_C	C32	T135	UNUSED	C30
T16	CH_R18	D9	T56	CH_R75	A8	T96	CH_R3	E1	T136	SHIELD	B30
T17	CH_R62	C3	T57	CH_R72	A7	T97	CH_R50	E26	T137	GND_C	C31
T18	CH_R61	B3	T58	CH_R69	A6	T98	CH_R49	D26	T138	SHIELD	B31
T19	UNUSED	C2	T59	CH_R66	A5	T99	CH_R46	E24	T139	UNUSED	B29
T20	CH_C4	B2	T60	CH_R63	A4	T100	CH_R45	D24	T140	CH_R52	C29
T21	CH_R65	C4	T61	UNUSED	A3	T101	UNUSED	E27	T141	CH_R127	B28
T22	CH_R64	B4	T62	CH_C2	A2	T102	CH_R51	D27	T142	CH_R128	C28
T23	CH_R68	C5	T63	CH_R82	B10	T103	UNUSED	E28	T143	CH_R119	C25
T24	CH_R67	B5	T64	CH_R83	C10	T104	UNUSED	D28	T144	UNUSED	B25
T25	CH_R71	C6	T65	CH_R31	E15	T105	CH_R44	E23	T145	CH_R124	B27
T26	CH_R70	B6	T66	CH_R30	D15	T106	CH_R43	D23	T146	CH_R125	C27
T27	CH_R74	C7	T67	CH_R33	E16	T107	CH_R42	E22	T147	CH_R121	B26
T28	CH_R73	B7	T68	CH_R32	D16	T108	CH_R41	D22	T148	CH_R122	C26
T29	CH_R77	C8	T69	UNUSED	E17	T109	CH_R47	D25	T149	CH_R120	A26
T30	CH_R76	B8	T70	CH_R34	D17	T110	CH_R48	E25	T150	CH_R123	A27
T31	CH_R80	C9	T71	UNUSED	E18	T111	CH_R38	E20	T151	CH_R126	A28
T32	CH_R79	B9	T72	UNUSED	D18	T112	CH_R37	D20	T152	UNUSED	A29
T33	CH_R23	E11	T73	CH_R36	E19	T113	CH_R110	C22	T153	GND_C	A30
T34	CH_R22	D11	T74	CH_R35	D19	T114	CH_R112	B22	T154	GND_C	A31
T35	CH_R24	D12	T75	CH_R107	C21	T115	CH_R113	C23	T155	CH_R54	E32
T36	CH_R25	E12	T76	CH_R109	B21	T116	CH_R115	B23	T156	CH_C3	B1
T37	CH_R26	D13	T77	CH_R2	D1	T117	CH_R116	C24	T157	GND_C	A32
T38	CH_R27	E13	T78	CH_R108	A21	T118	CH_R118	B24	T158	CH_C1	A1
T39	CH_R28	D14	T79	CH_R39	D21	T119	CH_R117	A24	T159	SHIELD	B32
T40	CH_R29	E14	T80	CH_R40	E21	T120	UNUSED	A25	T160	CH_R1	C1

TABLE 4-32: EX1200-TB160SE TERMINAL BLOCK TO EX1200-4128 PIN MAPPING

EX1200-4128 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	4 x 128 one-wire cross-point matrix
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	250 V AC, 220 V DC
MAXIMUM SWITCHING CURRENT	
	1 A
MAXIMUM SWITCHING POWER	
	60 W dc, 62.5 VA
RATED SWITCH OPERATIONS	
Mechanical	1×10^8
Electrical	1×10^5 at full load
SWITCHING TIME	
	5 ms typical
PATH RESISTANCE	
	< 1 Ω
INSULATION RESISTANCE	
	> 1×10^9 Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 10 µV
BANDWIDTH (-3 dB)	
	3 MHz (typical)
CROSSTALK	
1 MHz	< -55 dB< -30 dB
10 MHz	
ISOLATION	
1 MHz	< -60 dB
10 MHz	< -30 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-4260 PLUG-IN MODULE

2 X 60 2-WIRE MATRIX

The EX1200-4260 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-6 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

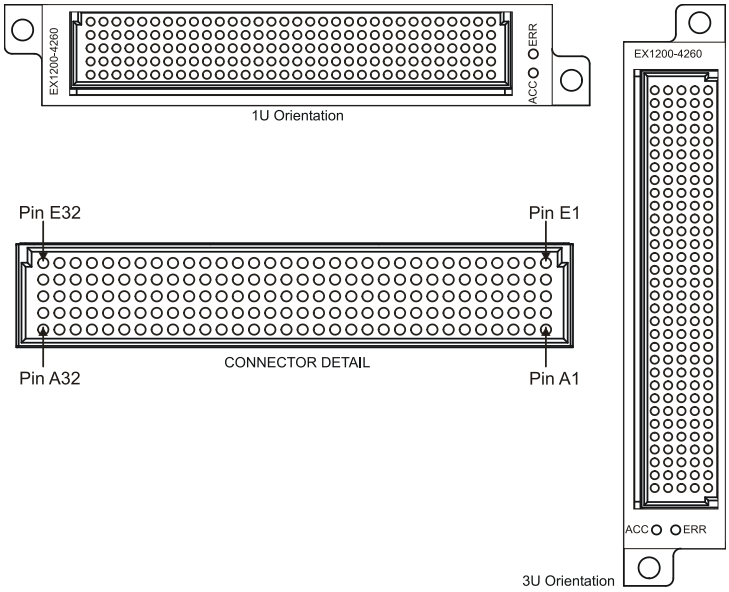


FIGURE 4-35: EX1200-4260 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	UNUSED	**1**	CH1_R1	**1**	CH1_R2	**1**	CH1_R3	**1**	CH1_R4
2	CH1_C1	**2**	CH1_R5	**2**	CH1_R6	**2**	CH1_R7	**2**	CH1_R8
3	CH1_C2	**3**	CH1_R9	**3**	CH1_R10	**3**	CH1_R11	**3**	CH1_R12
4	CH1_C3	**4**	CH1_R13	**4**	CH1_R14	**4**	CH1_R15	**4**	CH1_R16
5	CH1_C4	**5**	CH1_R17	**5**	CH1_R18	**5**	CH1_R19	**5**	CH1_R20
6	UNUSED	**6**	CH1_R21	**6**	CH1_R22	**6**	CH1_R23	**6**	CH1_R24
7	UNUSED	**7**	CH1_R25	**7**	CH1_R26	**7**	CH1_R27	**7**	CH1_R28
8	UNUSED	**8**	CH1_R29	**8**	CH1_R30	**8**	CH1_R31	**8**	CH1_R32
9	SHIELD	**9**	CH1_R33	**9**	CH1_R34	**9**	CH1_R35	**9**	CH1_R36
10	SHIELD	**10**	CH1_R37	**10**	CH1_R38	**10**	CH1_R39	**10**	CH1_R40
11	SHIELD	**11**	CH1_R41	**11**	CH1_R42	**11**	CH1_R43	**11**	CH1_R44
12	SHIELD	**12**	CH1_R45	**12**	CH1_R46	**12**	CH1_R47	**12**	CH1_R48
13	SHIELD	**13**	CH1_R49	**13**	CH1_R50	**13**	CH1_R51	**13**	CH1_R52
14	SHIELD	**14**	CH1_R53	**14**	CH1_R54	**14**	CH1_R55	**14**	CH1_R56
15	SHIELD	**15**	CH1_R57	**15**	CH1_R58	**15**	CH1_R59	**15**	CH1_R60
16	SHIELD	**16**	UNUSED	**16**	UNUSED	**16**	UNUSED	**16**	UNUSED
17	SHIELD	**17**	CH2_R1	**17**	CH2_R2	**17**	UNUSED	**17**	UNUSED
18	SHIELD	**18**	CH2_R5	**18**	CH2_R6	**18**	UNUSED	**18**	UNUSED
19	SHIELD	**19**	CH2_R9	**19**	CH2_R10	**19**	CH2_R59	**19**	CH2_R60
20	SHIELD	**20**	CH2_R13	**20**	CH2_R14	**20**	CH2_R57	**20**	CH2_R58
21	SHIELD	**21**	CH2_R17	**21**	CH2_R18	**21**	CH2_R55	**21**	CH2_R56
22	SHIELD	**22**	CH2_R21	**22**	CH2_R22	**22**	CH2_R53	**22**	CH2_R54
23	SHIELD	**23**	CH2_R25	**23**	CH2_R26	**23**	CH2_R51	**23**	CH2_R52
24	SHIELD	**24**	CH2_R31	**24**	CH2_R32	**24**	CH2_R49	**24**	CH2_R50
25	UNUSED	**25**	CH2_R3	**25**	CH2_R4	**25**	CH2_R47	**25**	CH2_R48
26	UNUSED	**26**	CH2_R7	**26**	CH2_R8	**26**	CH2_R45	**26**	CH2_R46
27	UNUSED	**27**	CH2_R11	**27**	CH2_R12	**27**	CH2_R43	**27**	CH2_R44
28	CH2_C1	**28**	CH2_R15	**28**	CH2_R16	**28**	CH2_R41	**28**	CH2_R42
29	CH2_C2	**29**	CH2_R19	**29**	CH2_R20	**29**	CH2_R39	**29**	CH2_R40
30	CH2_C3	**30**	CH2_R23	**30**	CH2_R24	**30**	CH2_R37	**30**	CH2_R38
31	CH2_C4	**31**	CH2_R27	**31**	CH2_R28	**31**	CH2_R35	**31**	CH2_R36
32	UNUSED	**32**	CH2_R29	**32**	CH2_R30	**32**	CH2_R33	**32**	CH2_R34

TABLE 4-33: CONNECTOR PINS & SIGNAL ASSIGNMENTS

Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal
B1	H	CH1_MC1	B9	H	CH1_MC17	B18	H	CH2_MC3	D30	H	CH2_MC19
D1	L		D9	L		B26	L		D29	L	
C1	H	CH1_MC2	C9	H	CH1_MC18	C18	H	CH2_MC4	E30	H	CH2_MC20
E1	L		E9	L		C26	L		E29	L	
B2	H	CH1_MC3	B10	H	CH1_MC19	B19	H	CH2_MC5	D28	H	CH2_MC21
D2	L		D10	L		B27	L		D27	L	
C2	H	CH1_MC4	C10	H	CH1_MC20	C19	H	CH2_MC6	E28	H	CH2_MC22
E2	L		E10	L		C27	L		E27	L	
B3	H	CH1_MC5	B11	H	CH1_MC21	B20	H	CH2_MC7	D26	H	CH2_MC23
D3	L		D11	L		B28	L		D25	L	
C3	H	CH1_MC6	C11	H	CH1_MC22	C20	H	CH2_MC8	E26	H	CH2_MC24
E3	L		E11	L		C28	L		E25	L	
B4	H	CH1_MC7	B12	H	CH1_MC23	B21	H	CH2_MC9	D24	H	CH2_MC25
D4	L		D12	L		B29	L		D23	L	
C4	H	CH1_MC8	C12	H	CH1_MC24	C21	H	CH2_MC10	E24	H	CH2_MC26
E4	L		E12	L		C29	L		E23	L	
B5	H	CH1_MC9	B13	H	CH1_MC25	B22	H	CH2_MC11	D22	H	CH2_MC27
D5	L		D13	L		B30	L		D21	L	
C5	H	CH1_MC10	C13	H	CH1_MC26	C22	H	CH2_MC12	E22	H	CH2_MC28
E5	L		E13	L		C30	L		E21	L	
B6	H	CH1_MC11	B14	H	CH1_MC27	B23	H	CH2_MC13	D20	H	CH2_MC29
D6	L		D14	L		B31	L		D19	L	
C6	H	CH1_MC12	C14	H	CH1_MC28	C23	H	CH2_MC14	E20	H	CH2_MC30
E6	L		E14	L		C31	L		E19	L	
B7	H	CH1_MC13	B15	H	CH1_MC29	B32	H	CH2_MC15			
D7	L		D15	L		B24	L				
C7	H	CH1_MC14	C15	H	CH1_MC30	C32	H	CH2_MC16			
E7	L		E15	L		C24	L				
B8	H	CH1_MC15	B17	H	CH2_MC1	D32	H	CH2_MC17			
D8	L		B24	L		D31	L				
C8	H	CH1_MC16	C17	H	CH2_MC2	E32	H	CH2_MC18			
E8	L		D24	L		E31	L				

2-Wire Common and Backplane Signal Names

Pin/DMM Bus Line	H/L	Signal	Pin/DMM Bus Line	H/L	Signal
A2	H	CH1_MC1_COM	A28	H	CH2_MC1_COM
A4	L		A30	L	
A3	H	CH1_MC2_COM	A29	H	CH2_MC2_COM
A5	L		A31	L	
BPL_HI	H	ACV	BPL_HI	H	DCV
BPL_LO	L		BPL_LO	L	
BPL_HI	H	2WOHM			
BPL_LO	L				

TABLE 4-34: 2-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

NOTES The H/L column represents the "HI" and "LO" pins for the 2-wire signal.
The "BPL" references are lines available on the EX1200 mainframe backplane that connect the plug-in module to the on-board DMM (if installed). For more information on these lines, refer to the *EX1200 Series User's Manual*.

Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal
B1	H1	CH1_MC1_4W	B9	H1	CH1_MC9_4W	B18	H1	CH2_MC2_4W	D30	H1	CH2_MC10_4W
C1	H2		C9	H2		C18	H2		E30	H2	
D1	L1		D9	L1		B26	L1		D29	L1	
E1	L2		E9	L2		C26	L2		E29	L2	
C1	H1	CH1_MC2_4W	B10	H1	CH1_MC10_4W	B19	H1	CH2_MC3_4W	D28	H1	CH2_MC11_4W
B2	H2		C10	H2		C19	H2		E28	H2	
E1	L1		D10	L1		B27	L1		D27	L1	
D2	L2		E10	L2		C27	L2		E27	L2	
B3	H1	CH1_MC3_4W	B11	H1	CH1_MC11_4W	B20	H1	CH2_MC4_4W	D26	H1	CH2_MC12_4W
C3	H2		C11	H2		C20	H2		E26	H2	
D3	L1		D11	L1		B28	L1		D25	L1	
E3	L2		E11	L2		C28	L2		E25	L2	
B4	H1	CH1_MC4_4W	B12	H1	CH1_MC12_4W	B21	H1	CH2_MC5_4W	D24	H1	CH2_MC13_4W
C4	H2		C12	H2		C21	H2		E24	H2	
D4	L1		D12	L1		B29	L1		D23	L1	
E4	L2		E12	L2		C29	L2		E23	L2	
B5	H1	CH1_MC5_4W	B13	H1	CH1_MC13_4W	B22	H1	CH2_MC6_4W	D22	H1	CH2_MC14_4W
C5	H2		C13	H2		C22	H2		E22	H2	
D5	L1		D13	L1		B30	L1		D21	L1	
E5	L2		E13	L2		C30	L2		E21	L2	
B6	H1	CH1_MC6_4W	B14	H1	CH1_MC14_4W	B23	H1	CH2_MC7_4W	D20	H1	CH2_MC15_4W
C6	H2		C14	H2		C23	H2		E20	H2	
D6	L1		D14	L1		B31	L1		D19	L1	
E6	L2		E14	L2		C31	L2		E19	L2	
B7	H1	CH1_MC7_4W	B15	H1	CH1_MC15_4W	B32	H1	CH2_MC8_4W			
C7	H2		C15	H2		C32	H2				
D7	L1		D15	L1		B24	L1				
E7	L2		E15	L2		C24	L2				
B8	H1	CH1_MC8_4W	B17	H1	CH2_MC1_4W	D32	H1	CH2_MC9_4W			
C8	H2		C17	H2		E32	H2				
D8	L1		B24	L1		D31	L1				
E8	L2		D24	L2		E31	L2				

4-Wire Common and Backplane Signal Names

Pin/DMM Bus Line	H/L	Signal	Pin/DMM Bus Line	H/L	Signal
A2	H1	CH1_MC_COM_4W	A28	H1	CH2_MC_COM_4W
A4	H2		A30	H2	
A3	L1		A29	L1	
A5	L2		A31	L2	
BPL_HI	H1	4WOHM			
BPL_SHI	H2				
BPL_LO	L1				
BPL_SLO	L2				

TABLE 4-35: 4-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

NOTES The H/L column represents the "HI" and "LO" pins for the 4-wire signal.
The "BPL" references are lines available on the EX1200 mainframe backplane that connect the plug-in module to the on-board DMM (if installed). For more information on these lines, refer to the *EX1200 Series User's Manual*.

LOGICAL DIAGRAM

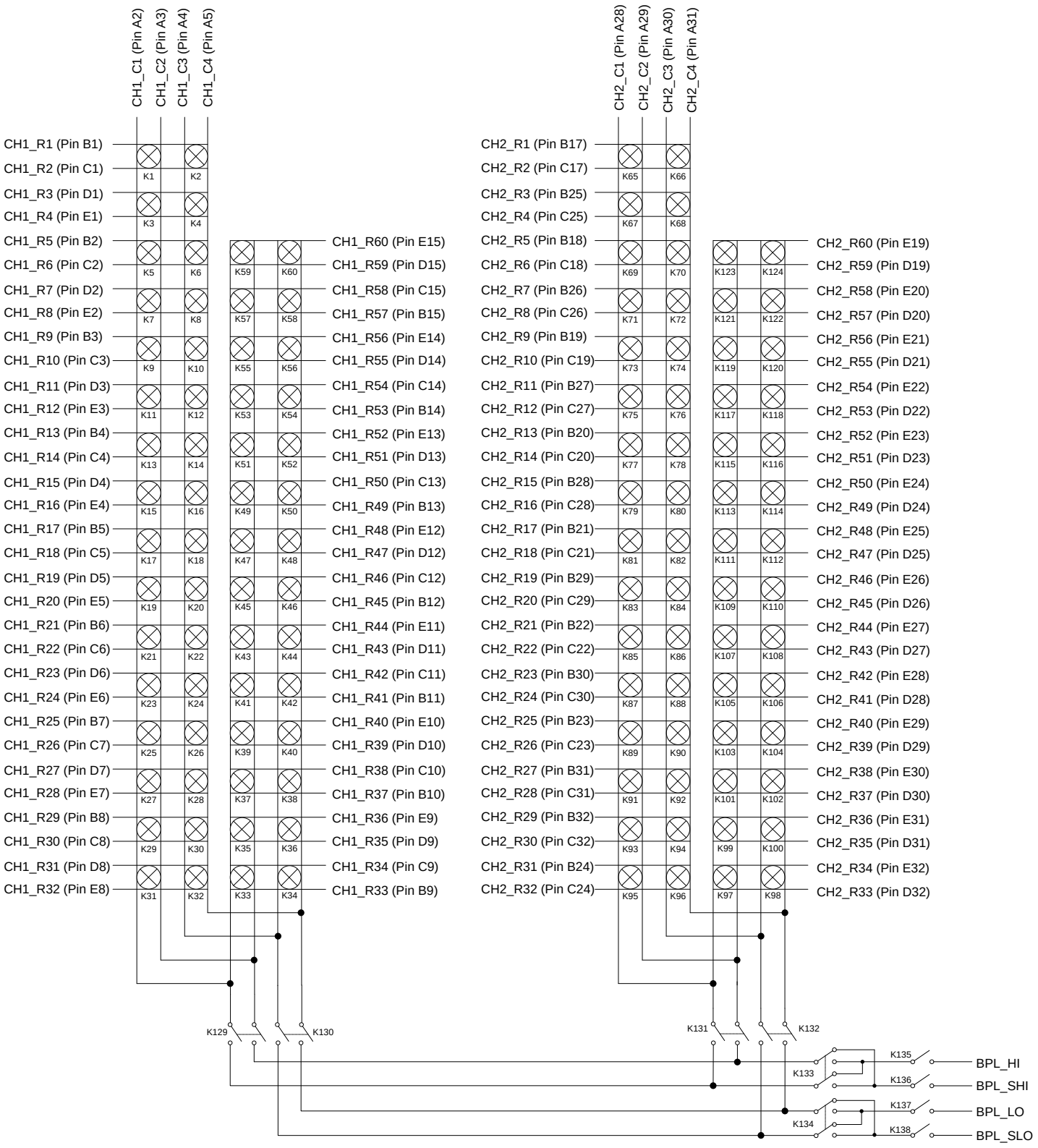


FIGURE 4-36: EX1200-4260 LOGICAL DIAGRAM

EX1200-4260 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Two 60 x 2 2-wire channels
RELAY TYPE	
	Electromechanically, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V dc/ 250 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W, 62.5 VA (see the Figure 4- for more information)
MINIMUM CONTACT RATING*	
	100 µV
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8
Electrical	1×10^5 at full load
SWITCHING TIME (TYPICAL)	
	< 10 ms
PATH RESISTANCE	
	< 0.5 Ω
INSULATION RESISTANCE	
	$>10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 10 µV
BANDWIDTH (-3 dB)	
	> 40 MHz
CROSSTALK (TYPICAL)	
1 MHz	< -45 dB
10 MHz	< -30 dB
ISOLATION (TYPICAL)	
1 MHz	< -60 dB
10 MHz	< -50 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

RELAY BREAKING CAPACITY

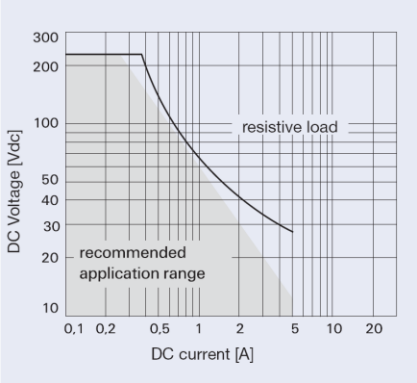


FIGURE 4-37: RELAY BREAKING CAPACITY

EX1200-4264 PLUG-IN MODULE

2 X 64 2-WIRE MATRIX

The EX1200-4264 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-9 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

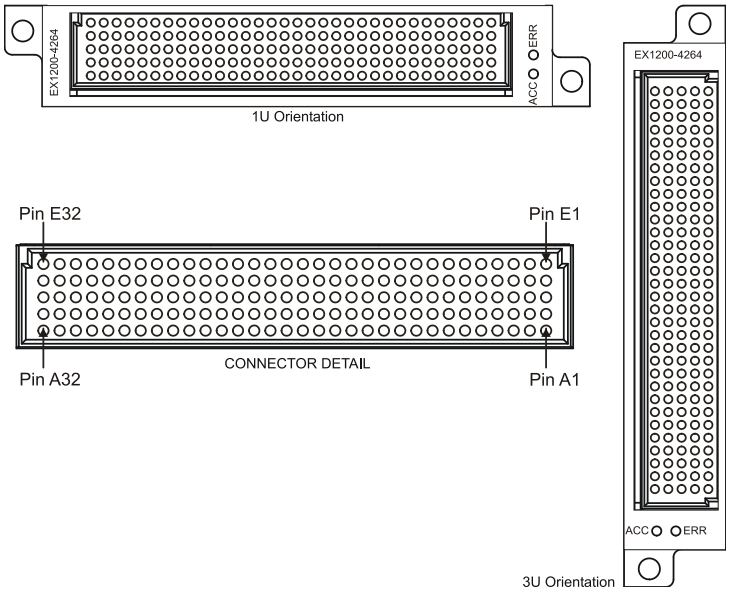


FIGURE 4-38: EX1200-4264 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	UNUSED	**1**	CH1_R1	**1**	CH1_R2	**1**	CH1_R3	**1**	CH1_R4
2	CH1_C1	**2**	CH1_R5	**2**	CH1_R6	**2**	CH1_R7	**2**	CH1_R8
3	CH1_C2	**3**	CH1_R9	**3**	CH1_R10	**3**	CH1_R11	**3**	CH1_R12
4	CH1_C3	**4**	CH1_R13	**4**	CH1_R14	**4**	CH1_R15	**4**	CH1_R16
5	CH1_C4	**5**	CH1_R17	**5**	CH1_R18	**5**	CH1_R19	**5**	CH1_R20
6	UNUSED	**6**	CH1_R21	**6**	CH1_R22	**6**	CH1_R23	**6**	CH1_R24
7	UNUSED	**7**	CH1_R25	**7**	CH1_R26	**7**	CH1_R27	**7**	CH1_R28
8	UNUSED	**8**	CH1_R29	**8**	CH1_R30	**8**	CH1_R31	**8**	CH1_R32
9	SHIELD	**9**	CH1_R33	**9**	CH1_R34	**9**	CH1_R35	**9**	CH1_R36
10	SHIELD	**10**	CH1_R37	**10**	CH1_R38	**10**	CH1_R39	**10**	CH1_R40
11	SHIELD	**11**	CH1_R41	**11**	CH1_R42	**11**	CH1_R43	**11**	CH1_R44
12	SHIELD	**12**	CH1_R45	**12**	CH1_R46	**12**	CH1_R47	**12**	CH1_R48
13	SHIELD	**13**	CH1_R49	**13**	CH1_R50	**13**	CH1_R51	**13**	CH1_R52
14	SHIELD	**14**	CH1_R53	**14**	CH1_R54	**14**	CH1_R55	**14**	CH1_R56
15	SHIELD	**15**	CH1_R57	**15**	CH1_R58	**15**	CH1_R59	**15**	CH1_R60
16	SHIELD	**16**	CH1_R61	**16**	CH1_R62	**16**	CH1_R63	**16**	CH1_R64
17	SHIELD	**17**	CH2_R1	**17**	CH2_R2	**17**	CH2_R63	**17**	CH2_R64
18	SHIELD	**18**	CH2_R5	**18**	CH2_R6	**18**	CH2_R61	**18**	CH2_R62
19	SHIELD	**19**	CH2_R9	**19**	CH2_R10	**19**	CH2_R59	**19**	CH2_R60
20	SHIELD	**20**	CH2_R13	**20**	CH2_R14	**20**	CH2_R57	**20**	CH2_R58
21	SHIELD	**21**	CH2_R17	**21**	CH2_R18	**21**	CH2_R55	**21**	CH2_R56
22	SHIELD	**22**	CH2_R21	**22**	CH2_R22	**22**	CH2_R53	**22**	CH2_R54
23	SHIELD	**23**	CH2_R25	**23**	CH2_R26	**23**	CH2_R51	**23**	CH2_R52
24	SHIELD	**24**	CH2_R31	**24**	CH2_R32	**24**	CH2_R49	**24**	CH2_R50
25	UNUSED	**25**	CH2_R3	**25**	CH2_R4	**25**	CH2_R47	**25**	CH2_R48
26	UNUSED	**26**	CH2_R7	**26**	CH2_R8	**26**	CH2_R45	**26**	CH2_R46
27	UNUSED	**27**	CH2_R11	**27**	CH2_R12	**27**	CH2_R43	**27**	CH2_R44
28	CH2_C1	**28**	CH2_R15	**28**	CH2_R16	**28**	CH2_R41	**28**	CH2_R42
29	CH2_C2	**29**	CH2_R19	**29**	CH2_R20	**29**	CH2_R39	**29**	CH2_R40
30	CH2_C3	**30**	CH2_R23	**30**	CH2_R24	**30**	CH2_R37	**30**	CH2_R38
31	CH2_C4	**31**	CH2_R27	**31**	CH2_R28	**31**	CH2_R35	**31**	CH2_R36
32	UNUSED	**32**	CH2_R29	**32**	CH2_R30	**32**	CH2_R33	**32**	CH2_R34

TABLE 4-36: CONNECTOR PINS & SIGNAL ASSIGNMENTS

Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal
B1	H	CH1_MC1	B9	H	CH1_MC17	B17	H	CH2_MC1	D32	H	CH2_MC17
D1	L		D9	L		B24	L		D31	L	
C1	H	CH1_MC2	C9	H	CH1_MC18	C17	H	CH2_MC2	E32	H	CH2_MC18
E1	L		E9	L		D24	L		E31	L	
B2	H	CH1_MC3	B10	H	CH1_MC19	B18	H	CH2_MC3	D30	H	CH2_MC19
D2	L		D10	L		B26	L		D29	L	
C2	H	CH1_MC4	C10	H	CH1_MC20	C18	H	CH2_MC4	E30	H	CH2_MC20
E2	L		E10	L		C26	L		E29	L	
B3	H	CH1_MC5	B11	H	CH1_MC21	B19	H	CH2_MC5	D28	H	CH2_MC21
D3	L		D11	L		B27	L		D27	L	
C3	H	CH1_MC6	C11	H	CH1_MC22	C19	H	CH2_MC6	E28	H	CH2_MC22
E3	L		E11	L		C27	L		E27	L	
B4	H	CH1_MC7	B12	H	CH1_MC23	B20	H	CH2_MC7	D26	H	CH2_MC23
D4	L		D12	L		B28	L		D25	L	
C4	H	CH1_MC8	C12	H	CH1_MC24	C20	H	CH2_MC8	E26	H	CH2_MC24
E4	L		E12	L		C28	L		E25	L	
B5	H	CH1_MC9	B13	H	CH1_MC25	B21	H	CH2_MC9	D24	H	CH2_MC25
D5	L		D13	L		B29	L		D23	L	
C5	H	CH1_MC10	C13	H	CH1_MC26	C21	H	CH2_MC10	E24	H	CH2_MC26
E5	L		E13	L		C29	L		E23	L	
B6	H	CH1_MC11	B14	H	CH1_MC27	B22	H	CH2_MC11	D22	H	CH2_MC27
D6	L		D14	L		B30	L		D21	L	
C6	H	CH1_MC12	C14	H	CH1_MC28	C22	H	CH2_MC12	E22	H	CH2_MC28
E6	L		E14	L		C30	L		E21	L	
B7	H	CH1_MC13	B15	H	CH1_MC29	B23	H	CH2_MC13	D20	H	CH2_MC29
D7	L		D15	L		B31	L		D19	L	
C7	H	CH1_MC14	C15	H	CH1_MC30	C23	H	CH2_MC14	E20	H	CH2_MC30
E7	L		E15	L		C31	L		E19	L	
B8	H	CH1_MC15	B16	H	CH1_MC31	B32	H	CH2_MC15	D18	H	CH2_MC31
D8	L		D16	L		B24	L		D17	L	
C8	H	CH1_MC16	C16	H	CH1_MC32	C32	H	CH2_MC16	E18	H	CH2_MC32
E8	L		E16	L		C24	L		E17	L	

2-Wire Common and Backplane Signal Names

Pin/DMM Bus Line	H/L	Signal	Pin/DMM Bus Line	H/L	Signal
A2	H	CH1_MC1_COM	A28	H	CH2_MC1_COM
A4	L		A30	L	
A3	H	CH1_MC2_COM	A29	H	CH2_MC2_COM
A5	L		A31	L	
BPL_HI	H	ACV	BPL_HI	H	DCV
BPL_LO	L		BPL_LO	L	
BPL_HI	H	2WOHM			
BPL_LO	L				

TABLE 4-37: 2-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

NOTES The H/L column represents the "HI" and "LO" pins for the 2-wire signal.
The "BPL" references are lines available on the EX1200 mainframe backplane that connect the plug-in module to the on-board DMM (if installed). For more information on these lines, refer to the *EX1200 Series User's Manual*.

Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal	Pin	H/L	Signal
B1	H1	CH1_MC1_4W	B9	H1	CH1_MC9_4W	B17	H1	CH2_MC1_4W	D32	H1	CH2_MC9_4W
C1	H2		C9	H2		C17	H2		E32	H2	
D1	L1		D9	L1		B24	L1		D31	L1	
E1	L2		E9	L2		D24	L2		E31	L2	
C1	H1	CH1_MC2_4W	B10	H1	CH1_MC10_4W	B18	H1	CH2_MC2_4W	D30	H1	CH2_MC10_4W
B2	H2		C10	H2		C18	H2		E30	H2	
E1	L1		D10	L1		B26	L1		D29	L1	
D2	L2		E10	L2		C26	L2		E29	L2	
B3	H1	CH1_MC3_4W	B11	H1	CH1_MC11_4W	B19	H1	CH2_MC3_4W	D28	H1	CH2_MC11_4W
C3	H2		C11	H2		C19	H2		E28	H2	
D3	L1		D11	L1		B27	L1		D27	L1	
E3	L2		E11	L2		C27	L2		E27	L2	
B4	H1	CH1_MC4_4W	B12	H1	CH1_MC12_4W	B20	H1	CH2_MC4_4W	D26	H1	CH2_MC12_4W
C4	H2		C12	H2		C20	H2		E26	H2	
D4	L1		D12	L1		B28	L1		D25	L1	
E4	L2		E12	L2		C28	L2		E25	L2	
B5	H1	CH1_MC5_4W	B13	H1	CH1_MC13_4W	B21	H1	CH2_MC5_4W	D24	H1	CH2_MC13_4W
C5	H2		C13	H2		C21	H2		E24	H2	
D5	L1		D13	L1		B29	L1		D23	L1	
E5	L2		E13	L2		C29	L2		E23	L2	
B6	H1	CH1_MC6_4W	B14	H1	CH1_MC14_4W	B22	H1	CH2_MC6_4W	D22	H1	CH2_MC14_4W
C6	H2		C14	H2		C22	H2		E22	H2	
D6	L1		D14	L1		B30	L1		D21	L1	
E6	L2		E14	L2		C30	L2		E21	L2	
B7	H1	CH1_MC7_4W	B15	H1	CH1_MC15_4W	B23	H1	CH2_MC7_4W	D20	H1	CH2_MC15_4W
C7	H2		C15	H2		C23	H2		E20	H2	
D7	L1		D15	L1		B31	L1		D19	L1	
E7	L2		E15	L2		C31	L2		E19	L2	
B8	H1	CH1_MC8_4W	B16	H1	CH1_MC16_4W	B32	H1	CH2_MC8_4W	D18	H1	CH2_MC16_4W
C8	H2		C16	H2		C32	H2		E18	H2	
D8	L1		D16	L1		B24	L1		D17	L1	
E8	L2		E16	L2		C24	L2		E17	L2	

4-Wire Common and Backplane Signal Names

Pin/DMM Bus Line	H/L	Signal	Pin/DMM Bus Line	H/L	Signal
A2	H1	CH1_MC_COM_4W	A28	H1	CH2_MC_COM_4W
A4	H2		A30	H2	
A3	L1		A29	L1	
A5	L2		A31	L2	
BPL_HI	H1	4WOHM			
BPL_SHI	H2				
BPL_LO	L1				
BPL_SLO	L2				

TABLE 4-38: 4-WIRE CONNECTOR PINS & SIGNAL ASSIGNMENTS

NOTES The H/L column represents the "HI" and "LO" pins for the 4-wire signal.
The "BPL" references are lines available on the EX1200 mainframe backplane that connect the plug-in module to the on-board DMM (if installed). For more information on these lines, refer to the *EX1200 Series User's Manual*.

LOGICAL DIAGRAM

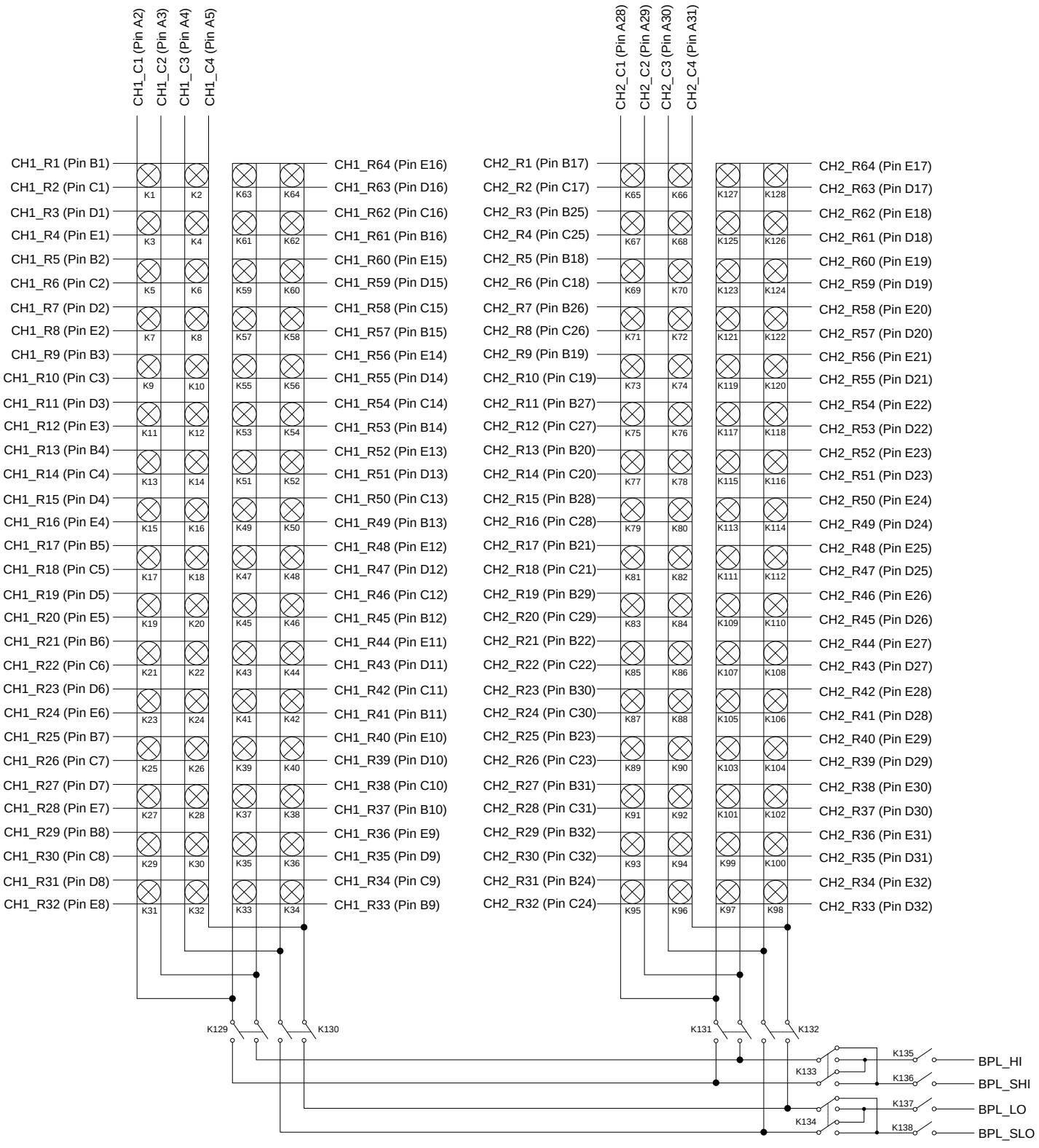


FIGURE 4-39: EX1200-4264 LOGICAL DIAGRAM

EX1200-4264 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Two 64x2 2-wire channels
RELAY TYPE	
	Electromechanically, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V dc/ 250 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W, 62.5 VA (see the Figure 4- for more information)
MINIMUM CONTACT RATING*	
	100 µV
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8
Electrical	1×10^5 at full load
SWITCHING TIME (TYPICAL)	
	< 10 ms
PATH RESISTANCE	
	< 0.5 Ω
INSULATION RESISTANCE	
	$>10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 10 µV
BANDWIDTH (-3 dB)	
	> 40 MHz
CROSSTALK (TYPICAL)	
1 MHz	< -45 dB
10 MHz	< -30 dB
ISOLATION (TYPICAL)	
1 MHz	< -60 dB
10 MHz	< -50 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

RELAY BREAKING CAPACITY

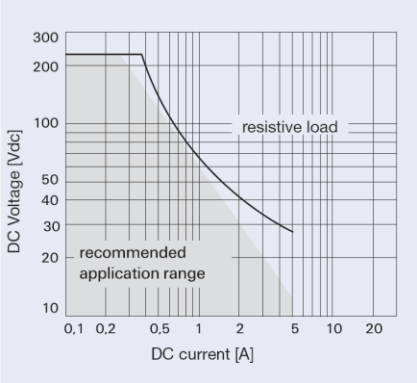


FIGURE 4-40: RELAY BREAKING CAPACITY

EX1200-5001 PLUG-IN MODULE

80-CHANNEL 2 AMP FORM A (SPST) SWITCH

The EX1200-5001 is a high-density general purpose 2 A switch modules designed for systems where individual relays can be used to route signals to/from the units under test (UUT), or combined externally to form user-defined configurations. These relays are commonly used to create complex signal distribution networks that can be reconfigured through different wiring in test adapters. Up to 480 SPST relays can be accommodated in a 1U full-rack mainframe for maximum density. The modules can also be configured with other EX1200 series switch modules as part of a flexible system switch design.

Since these modules may be used to switch power to the UUT or interface, the digital input lines on the EX1200 series mainframes support the ability to force all relays automatically to their normally open state if a fault condition occurs. This approach instantly removes all power to the UUT or interface. These modules can be automatically configured in the setup phase at the beginning of each scan step to facilitate test sequencing and control.

The EX1200-5001 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-2 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

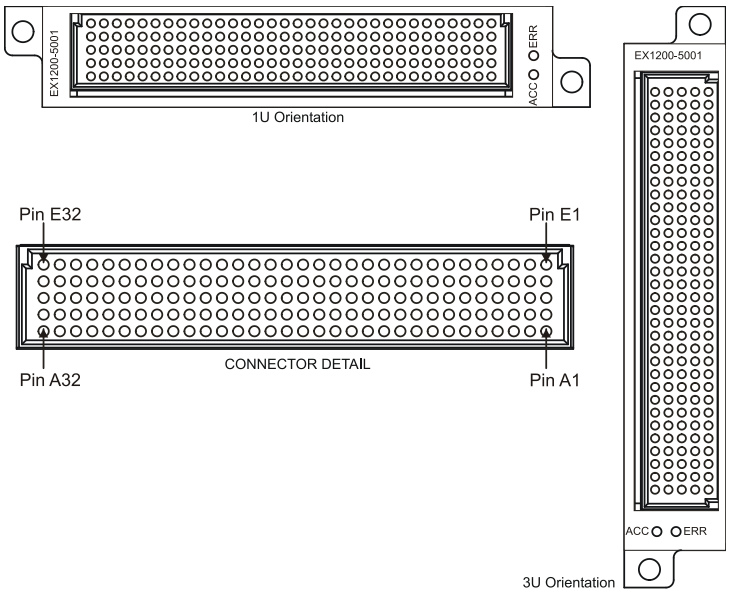


FIGURE 4-41: EX1200-5001 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH_1NO	**1**	CH_2NO	**1**	CH_3NO	**1**	CH_4NO	**1**	CH_5NO
2	CH_1COM	**2**	CH_2COM	**2**	CH_3COM	**2**	CH_4COM	**2**	CH_5COM
3	CH_6NO	**3**	CH_7NO	**3**	CH_8NO	**3**	CH_9NO	**3**	CH_10NO
4	CH_6COM	**4**	CH_7COM	**4**	CH_8COM	**4**	CH_9COM	**4**	CH_10COM
5	CH_11NO	**5**	CH_12NO	**5**	CH_13NO	**5**	CH_14NO	**5**	CH_15NO
6	CH_11COM	**6**	CH_12COM	**6**	CH_13COM	**6**	CH_14COM	**6**	CH_15COM
7	CH_16NO	**7**	CH_17NO	**7**	CH_18NO	**7**	CH_19NO	**7**	CH_20NO
8	CH_16COM	**8**	CH_17COM	**8**	CH_18COM	**8**	CH_19COM	**8**	CH_20COM
9	CH_21NO	**9**	CH_22NO	**9**	CH_23NO	**9**	CH_24NO	**9**	CH_25NO
10	CH_21COM	**10**	CH_22COM	**10**	CH_23COM	**10**	CH_24COM	**10**	CH_25COM
11	CH_26NO	**11**	CH_27NO	**11**	CH_28NO	**11**	CH_29NO	**11**	CH_30NO
12	CH_26COM	**12**	CH_27COM	**12**	CH_28COM	**12**	CH_29COM	**12**	CH_30COM
13	CH_31NO	**13**	CH_32NO	**13**	CH_33NO	**13**	CH_34NO	**13**	CH_35NO
14	CH_31COM	**14**	CH_32COM	**14**	CH_33COM	**14**	CH_34COM	**14**	CH_35COM
15	CH_36NO	**15**	CH_37NO	**15**	CH_38NO	**15**	CH_39NO	**15**	CH_40NO
16	CH_36COM	**16**	CH_37COM	**16**	CH_38COM	**16**	CH_39COM	**16**	CH_40COM
17	CH_41NO	**17**	CH_42NO	**17**	CH_43NO	**17**	CH_44NO	**17**	CH_45NO
18	CH_41COM	**18**	CH_42COM	**18**	CH_43COM	**18**	CH_44COM	**18**	CH_45COM
19	CH_46NO	**19**	CH_47NO	**19**	CH_48NO	**19**	CH_49NO	**19**	CH_50NO
20	CH_46COM	**20**	CH_47COM	**20**	CH_48COM	**20**	CH_49COM	**20**	CH_50COM
21	CH_51NO	**21**	CH_52NO	**21**	CH_53NO	**21**	CH_54NO	**21**	CH_55NO
22	CH_51COM	**22**	CH_52COM	**22**	CH_53COM	**22**	CH_54COM	**22**	CH_55COM
23	CH_56NO	**23**	CH_57NO	**23**	CH_58NO	**23**	CH_59NO	**23**	CH_60NO
24	CH_56COM	**24**	CH_57COM	**24**	CH_58COM	**24**	CH_59COM	**24**	CH_60COM
25	CH_61NO	**25**	CH_62NO	**25**	CH_63NO	**25**	CH_64NO	**25**	CH_65NO
26	CH_61COM	**26**	CH_62COM	**26**	CH_63COM	**26**	CH_64COM	**26**	CH_65COM
27	CH_66NO	**27**	CH_67NO	**27**	CH_68NO	**27**	CH_69NO	**27**	CH_70NO
28	CH_66COM	**28**	CH_67COM	**28**	CH_68COM	**28**	CH_69COM	**28**	CH_70COM
29	CH_71NO	**29**	CH_72NO	**29**	CH_73NO	**29**	CH_74NO	**29**	CH_75NO
30	CH_71COM	**30**	CH_72COM	**30**	CH_73COM	**30**	CH_74COM	**30**	CH_75COM
31	CH_76NO	**31**	CH_77NO	**31**	CH_78NO	**31**	CH_79NO	**31**	CH_80NO
32	CH_76COM	**32**	CH_77COM	**32**	CH_78COM	**32**	CH_79COM	**32**	CH_80COM

TABLE 4-39: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

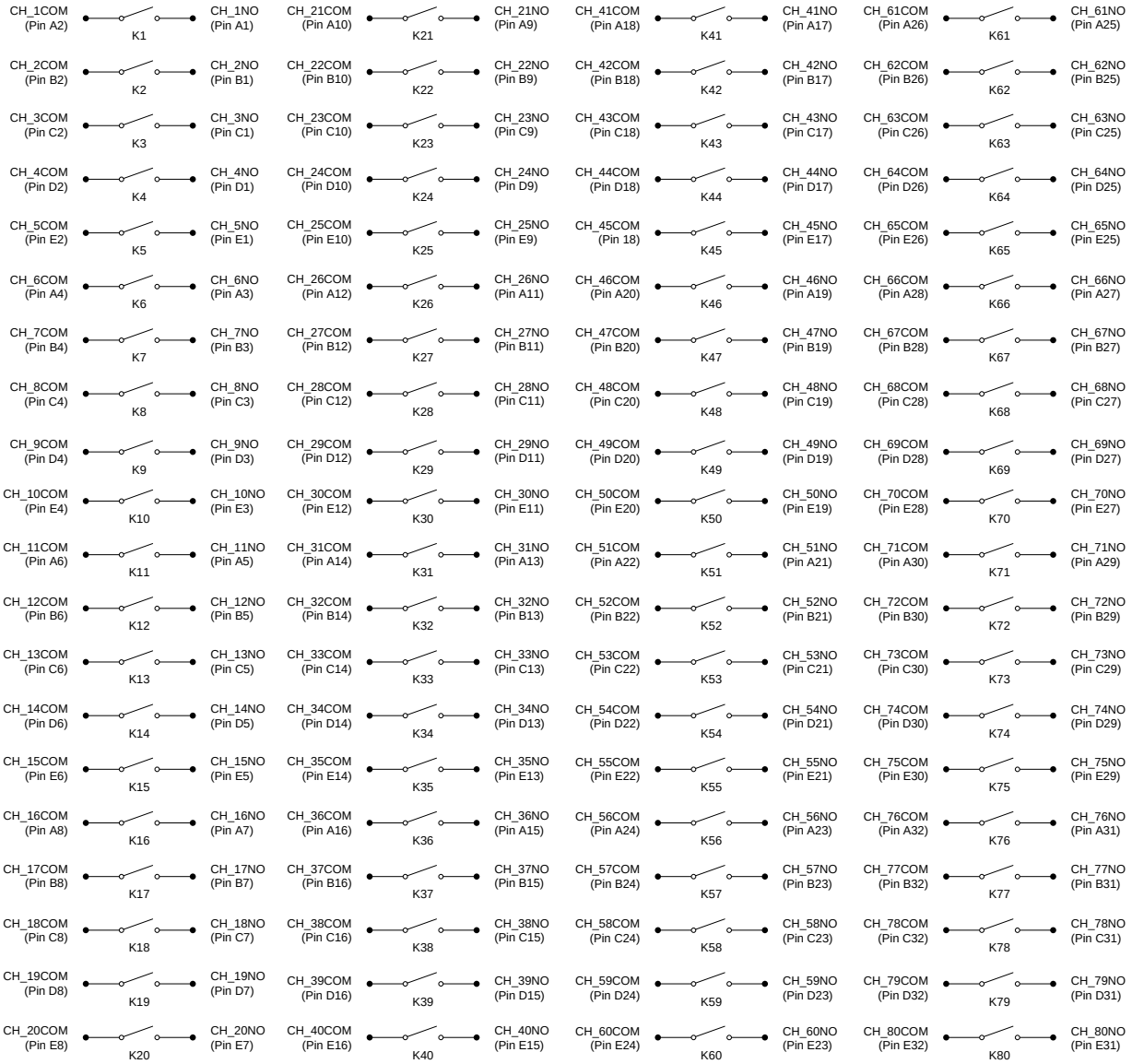

CH_1COM (Pin A2) K1 CH_1NO (Pin A1)
CH_21COM (Pin A10) K21 CH_21NO (Pin A9)
CH_41COM (Pin A18) K41 CH_41NO (Pin A17)
CH_61COM (Pin A26) K61 CH_61NO (Pin A25)
CH_2COM (Pin B2) K2 CH_2NO (Pin B1)
CH_22COM (Pin B10) K22 CH_22NO (Pin B9)
CH_42COM (Pin B18) K42 CH_42NO (Pin B17)
CH_62COM (Pin B26) K62 CH_62NO (Pin B25)
CH_3COM (Pin C2) K3 CH_3NO (Pin C1)
CH_23COM (Pin C10) K23 CH_23NO (Pin C9)
CH_43COM (Pin C18) K43 CH_43NO (Pin C17)
CH_63COM (Pin C26) K63 CH_63NO (Pin C25)
CH_4COM (Pin D2) K4 CH_4NO (Pin D1)
CH_24COM (Pin D10) K24 CH_24NO (Pin D9)
CH_44COM (Pin D18) K44 CH_44NO (Pin D17)
CH_64COM (Pin D26) K64 CH_64NO (Pin D25)
CH_5COM (Pin E2) K5 CH_5NO (Pin E1)
CH_25COM (Pin E10) K25 CH_25NO (Pin E9)
CH_45COM (Pin 18) K45 CH_45NO (Pin E17)
CH_65COM (Pin E26) K65 CH_65NO (Pin E25)
CH_6COM (Pin A4) K6 CH_6NO (Pin A3)
CH_26COM (Pin A12) K26 CH_26NO (Pin A11)
CH_46COM (Pin A20) K46 CH_46NO (Pin A19)
CH_66COM (Pin A28) K66 CH_66NO (Pin A27)
CH_7COM (Pin B4) K7 CH_7NO (Pin B3)
CH_27COM (Pin B12) K27 CH_27NO (Pin B11)
CH_47COM (Pin B20) K47 CH_47NO (Pin B19)
CH_67COM (Pin B28) K67 CH_67NO (Pin B27)
CH_8COM (Pin C4) K8 CH_8NO (Pin C3)
CH_28COM (Pin C12) K28 CH_28NO (Pin C11)
CH_48COM (Pin C20) K48 CH_48NO (Pin C19)
CH_68COM (Pin C28) K68 CH_68NO (Pin C27)
CH_9COM (Pin D4) K9 CH_9NO (Pin D3)
CH_29COM (Pin D12) K29 CH_29NO (Pin D11)
CH_49COM (Pin D20) K49 CH_49NO (Pin D19)
CH_69COM (Pin D28) K69 CH_69NO (Pin D27)
CH_10COM (Pin E4) K10 CH_10NO (Pin E3)
CH_30COM (Pin E12) K30 CH_30NO (Pin E11)
CH_50COM (Pin E20) K50 CH_50NO (Pin E19)
CH_70COM (Pin E28) K70 CH_70NO (Pin E27)
CH_11COM (Pin A6) K11 CH_11NO (Pin A5)
CH_31COM (Pin A14) K31 CH_31NO (Pin A13)
CH_51COM (Pin A22) K51 CH_51NO (Pin A21)
CH_71COM (Pin A30) K71 CH_71NO (Pin A29)
CH_12COM (Pin B6) K12 CH_12NO (Pin B5)
CH_32COM (Pin B14) K32 CH_32NO (Pin B13)
CH_52COM (Pin B22) K52 CH_52NO (Pin B21)
CH_72COM (Pin B30) K72 CH_72NO (Pin B29)
CH_13COM (Pin C6) K13 CH_13NO (Pin C5)
CH_33COM (Pin C14) K33 CH_33NO (Pin C13)
CH_53COM (Pin C22) K53 CH_53NO (Pin C21)
CH_73COM (Pin C30) K73 CH_73NO (Pin C29)
CH_14COM (Pin D6) K14 CH_14NO (Pin D5)
CH_34COM (Pin D14) K34 CH_34NO (Pin D13)
CH_54COM (Pin D22) K54 CH_54NO (Pin D21)
CH_74COM (Pin D30) K74 CH_74NO (Pin D29)
CH_15COM (Pin E6) K15 CH_15NO (Pin E5)
CH_35COM (Pin E14) K35 CH_35NO (Pin E13)
CH_55COM (Pin E22) K55 CH_55NO (Pin E21)
CH_75COM (Pin E30) K75 CH_75NO (Pin E29)
CH_16COM (Pin A8) K16 CH_16NO (Pin A7)
CH_36COM (Pin A16) K36 CH_36NO (Pin A15)
CH_56COM (Pin A24) K56 CH_56NO (Pin A23)
CH_76COM (Pin A32) K76 CH_76NO (Pin A31)
CH_17COM (Pin B8) K17 CH_17NO (Pin B7)
CH_37COM (Pin B16) K37 CH_37NO (Pin B15)
CH_57COM (Pin B24) K57 CH_57NO (Pin B23)
CH_77COM (Pin B32) K77 CH_77NO (Pin B31)
CH_18COM (Pin C8) K18 CH_18NO (Pin C7)
CH_38COM (Pin C16) K38 CH_38NO (Pin C15)
CH_58COM (Pin C24) K58 CH_58NO (Pin C23)
CH_78COM (Pin C32) K78 CH_78NO (Pin C31)
CH_19COM (Pin D8) K19 CH_19NO (Pin D7)
CH_39COM (Pin D16) K39 CH_39NO (Pin D15)
CH_59COM (Pin D24) K59 CH_59NO (Pin D23)
CH_79COM (Pin D32) K79 CH_79NO (Pin D31)
CH_20COM (Pin E8) K20 CH_20NO (Pin E7)
CH_40COM (Pin E16) K40 CH_40NO (Pin E15)
CH_60COM (Pin E24) K60 CH_60NO (Pin E23)
CH_80COM (Pin E32) K80 CH_80NO (Pin E31)

FIGURE 4-42: EX1200-5001 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH_5COM	E2	T41	CH_36NO	A15	T81	CH_33COM	C14	T121	CH_51COM	A22
T2	CH_4COM	D2	T42	CH_31COM	A14	T82	CH_32COM	B14	T122	CH_56NO	A23
T3	CH_10NO	E3	T43	CH_31NO	A13	T83	CH_38NO	C15	T123	CH_46COM	A20
T4	CH_9NO	D3	T44	CH_26COM	A12	T84	CH_37NO	B15	T124	CH_41COM	A18
T5	CH_10COM	E4	T45	CH_21COM	A10	T85	CH_38COM	C16	T125	CH_46NO	A19
T6	CH_9COM	D4	T46	CH_24COM	D10	T86	CH_37COM	B16	T126	CH_36COM	A16
T7	CH_15NO	E5	T47	CH_25COM	E10	T87	CH_43NO	C17	T127	CH_41NO	A17
T8	CH_14NO	D5	T48	CH_28NO	C11	T88	CH_42NO	B17	T128	CH_79COM	D32
T9	CH_15COM	E6	T49	CH_27NO	B11	T89	CH_43COM	C18	T129	CH_75COM	E30
T10	CH_14COM	D6	T50	CH_26NO	A11	T90	CH_42COM	B18	T130	CH_74COM	D30
T11	CH_20NO	E7	T51	CH_27COM	B12	T91	CH_48NO	C19	T131	CH_75NO	E29
T12	CH_19NO	D7	T52	CH_28COM	C12	T92	CH_47NO	B19	T132	CH_74NO	D29
T13	CH_20COM	E8	T53	CH_32NO	B13	T93	CH_48COM	C20	T133	CH_80NO	E31
T14	CH_19COM	D8	T54	CH_33NO	C13	T94	CH_47COM	B20	T134	CH_79NO	D31
T15	CH_25NO	E9	T55	CH_21NO	A9	T95	CH_78COM	C32	T135	CH_73COM	C30
T16	CH_24NO	D9	T56	CH_16COM	A8	T96	CH_5NO	E1	T136	CH_72COM	B30
T17	CH_8NO	C3	T57	CH_16NO	A7	T97	CH_65COM	E26	T137	CH_78NO	C31
T18	CH_7NO	B3	T58	CH_11COM	A6	T98	CH_64COM	D26	T138	CH_77NO	B31
T19	CH_3COM	C2	T59	CH_11NO	A5	T99	CH_60COM	E24	T139	CH_72NO	B29
T20	CH_2COM	B2	T60	CH_6COM	A4	T100	CH_59COM	D24	T140	CH_73NO	C29
T21	CH_8COM	C4	T61	CH_6NO	A3	T101	CH_70NO	E27	T141	CH_67COM	B28
T22	CH_7COM	B4	T62	CH_1COM	A2	T102	CH_69NO	D27	T142	CH_68COM	C28
T23	CH_13NO	C5	T63	CH_22COM	B10	T103	CH_70COM	E28	T143	CH_63NO	C25
T24	CH_12NO	B5	T64	CH_23COM	C10	T104	CH_69COM	D28	T144	CH_62NO	B25
T25	CH_13COM	C6	T65	CH_40NO	E15	T105	CH_60NO	E23	T145	CH_67NO	B27
T26	CH_12COM	B6	T66	CH_39NO	D15	T106	CH_59NO	D23	T146	CH_68NO	C27
T27	CH_18NO	C7	T67	CH_40COM	E16	T107	CH_55COM	E22	T147	CH_62COM	B26
T28	CH_17NO	B7	T68	CH_39COM	D16	T108	CH_54COM	D22	T148	CH_63COM	C26
T29	CH_18COM	C8	T69	CH_45NO	E17	T109	CH_64NO	D25	T149	CH_61COM	A26
T30	CH_17COM	B8	T70	CH_44NO	D17	T110	CH_65NO	E25	T150	CH_66NO	A27
T31	CH_23NO	C9	T71	CH_45COM	E18	T111	CH_50COM	E20	T151	CH_66COM	A28
T32	CH_22NO	B9	T72	CH_44COM	D18	T112	CH_49COM	D20	T152	CH_71NO	A29
T33	CH_30NO	E11	T73	CH_50NO	E19	T113	CH_53COM	C22	T153	CH_71COM	A30
T34	CH_29NO	D11	T74	CH_49NO	D19	T114	CH_52COM	B22	T154	CH_76NO	A31
T35	CH_29COM	D12	T75	CH_53NO	C21	T115	CH_58NO	C23	T155	CH_80COM	E32
T3	CH_30COM	E12	T76	CH_52NO	B21	T116	CH_57NO	B23	T156	CH_2NO	B1
T37	CH_34NO	D13	T77	CH_4NO	D1	T117	CH_58COM	C24	T157	CH_76COM	A32
T38	CH_35NO	E13	T78	CH_51NO	A21	T118	CH_57COM	B24	T158	CH_1NO	A1
T39	CH_34COM	D14	T79	CH_54NO	D21	T119	CH_56COM	A24	T159	CH_77COM	B32
T40	CH_35COM	E14	T80	CH_55NO	E21	T120	CH_61NO	A25	T160	CH_3NO	C1

TABLE 4-40: EX1200-TB160SE TERMINAL BLOCK TO EX1200-5001 PIN MAPPING

EX1200-5001 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	80 SPST / 40 DPST
RELAY TYPE	
	Electromechanically, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V dc, 300 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 300 mΩ
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 80 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	80 MHz (typical)
CROSSTALK (TYPICAL)	
100 kHz	< -55 dB
1 MHz	< -45 dB
ISOLATION (TYPICAL)	
100 kHz	< -50 dB
1 MHz	< -35 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-5002 PLUG-IN MODULE

32-CHANNEL, 2 AMP FORM C (SPDT) SWITCH

The EX1200-5002 is a high-density general purpose 2 A switch module designed for systems where individual relays can be used to route signals to/from the units under test (UUT), or combined externally to form user-defined configurations. These relays are commonly used to create complex signal distribution networks that can be reconfigured through different wiring in test adapters. For example, three relays on a -5002 module can be configured as a SP4T tree, and seven relays can be configured as a SP8T tree. Up to 192 individual SPDT or 384 SPST relays can be accommodated in a 1U EX1200 mainframe for maximum density. The modules can also be configured with other EX1200 series switch modules as part of a flexible system switch design.

Since these modules may be used to switch power to the UUT or interface, the digital input lines on the EX1200 series mainframes support the ability to force all relays automatically to their normally open state if a fault condition occurs. This approach instantly removes all power to the UUT or interface. These modules can be automatically configured in the setup phase at the beginning of each scan step to facilitate test sequencing and control.

The EX1200-5002 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-4 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

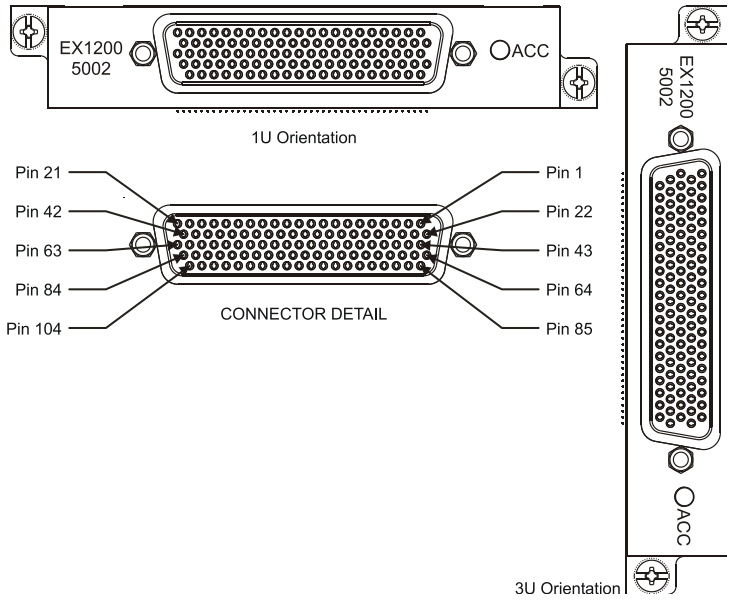


FIGURE 4-43: EX1200-5002 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH_1NO	**22**	CH_2NO	**43**	CH_3NO	**64**	CH_4NO	**85**	CH_5NO
2	CH_1COM	**23**	CH_2COM	**44**	CH_3COM	**65**	CH_4COM	**86**	CH_5COM
3	CH_1NC	**24**	CH_2NC	**45**	CH_3NC	**66**	CH_4NC	**87**	CH_5NC
4	CH_6NO	**25**	CH_7NO	**46**	CH_8NO	**67**	CH_9NO	**88**	CH_10NO
5	CH_6COM	**26**	CH_7COM	**47**	CH_8COM	**68**	CH_9COM	**89**	CH_10COM
6	CH_6NC	**27**	CH_7NC	**48**	CH_8NC	**69**	CH_9NC	**90**	CH_10NC
7	CH_11NO	**28**	CH_12NO	**49**	CH_13NO	**70**	CH_14NO	**91**	CH_15NO
8	CH_11COM	**29**	CH_12COM	**50**	CH_13COM	**71**	CH_14COM	**92**	CH_15COM
9	CH_11NC	**30**	CH_12NC	**51**	CH_13NC	**72**	CH_14NC	**93**	CH_15NC
10	CH_16NO	**31**	CH_17NO	**52**	CH_18NO	**73**	CH_19NO	**94**	CH_20NO
11	CH_16COM	**32**	CH_17COM	**53**	CH_18COM	**74**	CH_19COM	**95**	CH_20COM
12	CH_16NC	**33**	CH_17NC	**54**	CH_18NC	**75**	CH_19NC	**96**	CH_20NC
13	CH_21NO	**34**	CH_22NO	**55**	CH_23NO	**76**	CH_24NO	**97**	CH_25NO
14	CH_21COM	**35**	CH_22COM	**56**	CH_23COM	**77**	CH_24COM	**98**	CH_25COM
15	CH_NC_21	**36**	CH_22NC	**57**	CH_23NC	**78**	CH_24NC	**99**	CH_25NC
16	CH_26NO	**37**	CH_27NO	**58**	CH_28NO	**79**	CH_29NO	**100**	CH_30NO
17	CH_26COM	**38**	CH_27COM	**59**	CH_28COM	**80**	CH_29COM	**101**	CH_30COM
18	CH_26NC	**39**	CH_27NC	**60**	CH_28NC	**81**	CH_29NC	**102**	CH_30NC
19	CH_31NO	**40**	CH_32NO	**61**	SHIELD	**82**	SHIELD	**103**	GND_C
20	CH_31COM	**41**	CH_32COM	**62**	SHIELD	**83**	SHIELD	**104**	GND_C
21	CH_31NC	**42**	CH_32NC	**63**	SHIELD	**84**	SHIELD		

TABLE 4-41: CONNECTOR PINS & SIGNAL ASSIGNMENTS

The EX1200-5002 incorporates an integral shield into the design of the PCB that attenuates noise and crosstalk between adjacent channels/modules. To properly utilize this feature, tie the appropriate front panel connector pins to the mating cable's common shield and/or ground. These pins are identified as "SHIELD" in Table 4-141.

The module also incorporates ground pins, labeled "GND_C" above. These pins tie the module to chassis ground. Note that the SHIELD pins are not tied to ground and have no electrical connections.

LOGICAL DIAGRAM

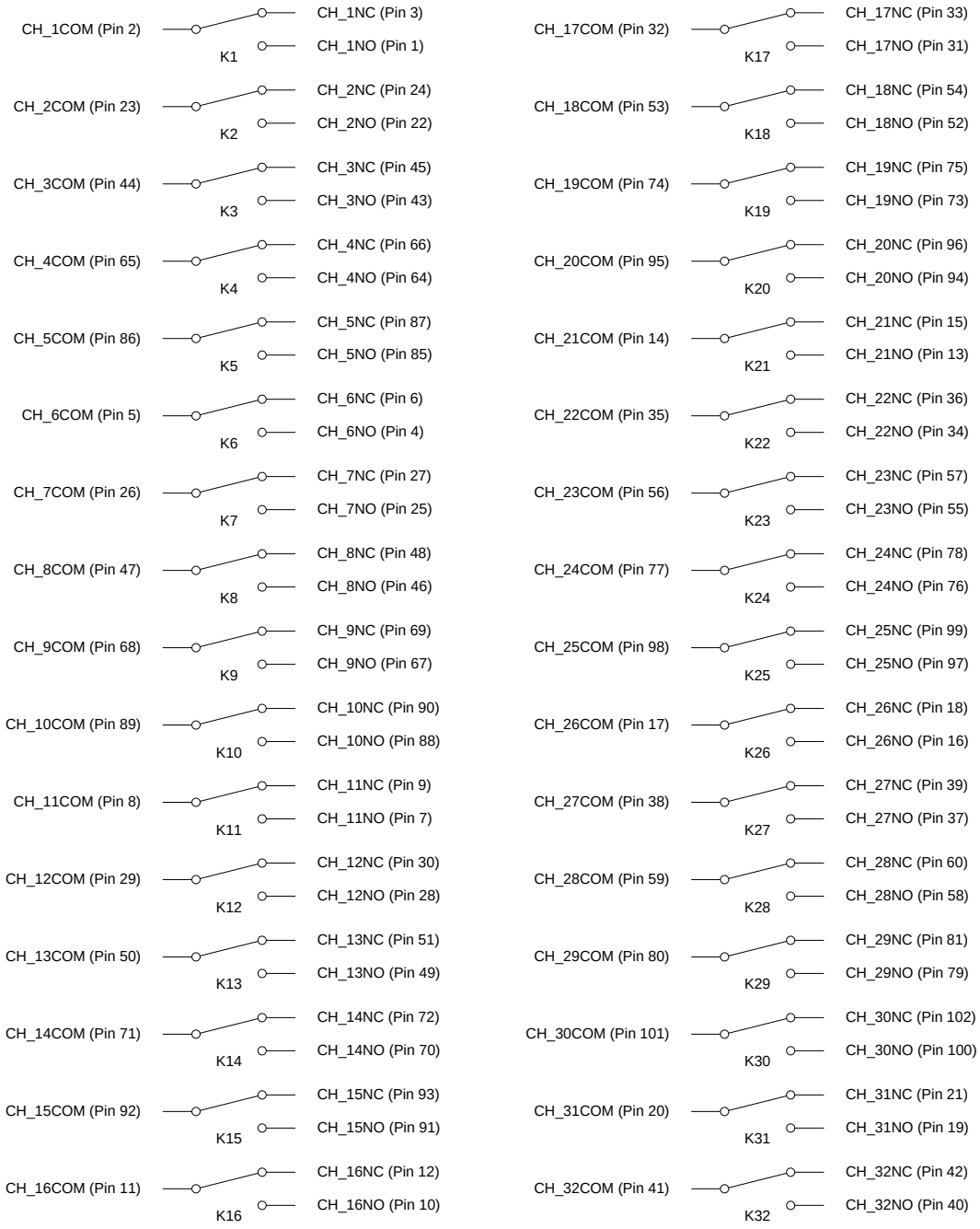


FIGURE 4-44: EX1200-5002 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH_1NO	1	T41	CH_27NO	37	T81	CH_18NO	52	T121	CH_NC	87
T2	CH_1COM	2	T42	CH_27COM	38	T82	CH_18COM	53	T122	CH_10NO	88
T3	CH_1NC	3	T43	CH_27NC	39	T83	CH_18NC	54	T123	CH_10COM	89
T4	CH_6NO	4	T44	CH_32NO	40	T84	CH_23NO	55	T124	CH_10NC	90
T5	CH_6COM	5	T45	CH_32COM	41	T85	CH_23COM	56	T125	CH_15NO	91
T6	CH_6NC	6	T46	CH_32NC	42	T86	CH_23NC	57	T126	CH_15COM	92
T7	CH_11NO	7	T47	UNUSED	N/A	T87	CH_28NO	58	T127	CH_15NC	93
T8	CH_11COM	8	T48	UNUSED	N/A	T88	CH_28COM	59	T128	SHIELD	83
T9	CH_11NC	9	T49	UNUSED	N/A	T89	CH_28NC	60	T129	CH_20NO	94
T10	CH_16NO	10	T50	UNUSED	N/A	T90	UNUSED	N/A	T130	CH_20COM	95
T11	CH_16COM	11	T51	UNUSED	N/A	T91	UNUSED	N/A	T131	CH_20NC	96
T12	CH_16NC	12	T52	UNUSED	N/A	T92	UNUSED	N/A	T132	CH_25NO	97
T13	CH_21NO	13	T53	UNUSED	N/A	T93	UNUSED	N/A	T133	CH_25COM	98
T14	CH_21COM	14	T54	UNUSED	N/A	T94	UNUSED	N/A	T134	CH_25NC	99
T15	CH_21NC	15	T55	UNUSED	N/A	T95	SHIELD	82	T135	CH_30NO	100
T16	UNUSED	N/A	T56	UNUSED	N/A	T96	UNUSED	N/A	T136	CH_30COM	101
T17	CH_26NO	16	T57	UNUSED	N/A	T97	CH_4NO	64	T137	CH_30NC	102
T18	CH_26COM	17	T58	UNUSED	N/A	T98	CH_4COM	65	T138	UNUSED	N/A
T19	CH_26NC	18	T59	UNUSED	N/A	T99	CH_4NC	66	T139	UNUSED	N/A
T20	CH_31NO	19	T60	UNUSED	N/A	T100	CH_9NO	67	T140	UNUSED	N/A
T21	CH_31COM	20	T61	UNUSED	N/A	T101	CH_9COM	68	T141	UNUSED	N/A
T22	CH31NC	21	T62	UNUSED	N/A	T102	CH_9NC	69	T142	UNUSED	N/A
T23	CH_2NO	22	T63	UNUSED	N/A	T103	CH_14NO	70	T143	UNUSED	N/A
T24	CH_2COM	23	T64	UNUSED	N/A	T104	CH_14COM	71	T144	UNUSED	N/A
T25	CH_2NC	24	T65	CH_3NO	43	T105	CH_14NC	72	T145	UNUSED	N/A
T26	CH_7NO	25	T66	CH_3COM	44	T106	CH_19NO	73	T146	UNUSED	N/A
T27	CH_7COM	26	T67	CH_3NC	45	T107	CH_19COM	74	T147	UNUSED	N/A
T28	CH_7NC	27	T68	CH_8NO	46	T108	CH_19NC	75	T148	UNUSED	N/A
T29	CH_12NO	28	T69	CH_8COM	47	T109	CH_24NO	76	T149	UNUSED	N/A
T30	CH_12COM	29	T70	CH_8NC	48	T110	CH_24COM	77	T150	UNUSED	N/A
T31	CH_12NC	30	T71	CH_13NO	49	T111	CH_24NC	78	T151	UNUSED	N/A
T32	UNUSED	N/A	T72	CH_13COM	50	T112	UNUSED	N/A	T152	UNUSED	N/A
T33	SHIELD	61	T73	CH_13NC	51	T113	CH_29NO	79	T153	UNUSED	N/A
T34	UNUSED	N/A	T74	UNUSED	N/A	T114	CH_29COM	80	T154	UNUSED	N/A
T35	CH_17NO	31	T75	UNUSED	N/A	T115	CH_29NC	81	T155	SHIELD	63, 84
T36	CH_17COM	32	T76	UNUSED	N/A	T116	UNUSED	N/A	T156	UNUSED	N/A
T37	CH_17NC	33	T77	UNUSED	N/A	T117	UNUSED	N/A	T157	GND_C	103
T38	CH_22NO	34	T78	UNUSED	N/A	T118	UNUSED	N/A	T158	UNUSED	N/A
T39	CH_22COM	35	T79	UNUSED	N/A	T119	CH_5NO	85	T159	GND_C	104
T40	CH_22NC	36	T80	SHIELD	62	T120	CH_5COM	86	T160	UNUSED	N/A

TABLE 4-42: EX1200-TB160SE TERMINAL BLOCK TO EX1200-5002 PIN MAPPING

EX1200-5002 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	32 SPDT
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V dc, 300 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 300 mΩ
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	<1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	<250 pF
High-low	<120 pF
BANDWIDTH (-3 dB)	
	30 MHz (typical)
CROSSTALK (TYPICAL)	
100 kHz	< -80 dB
1 MHz	< -60 dB
ISOLATION (TYPICAL)	
100 kHz	< -50 dB
1 MHz	< -45 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-5004 PLUG-IN MODULE

32-CHANNEL, 5 A SPDT SWITCH

The EX1200-5004 is a high-density 5 A switch module designed for switching applications such as process control, appliance pass/fail testing, and on/off control. Up to 192 individual SPDT relays can be accommodated in a 1U full-rack mainframe for maximum density. The modules can also be configured with other EX1200 series switch modules as part of a flexible system switch design.

CONNECTOR PINS AND SIGNALS

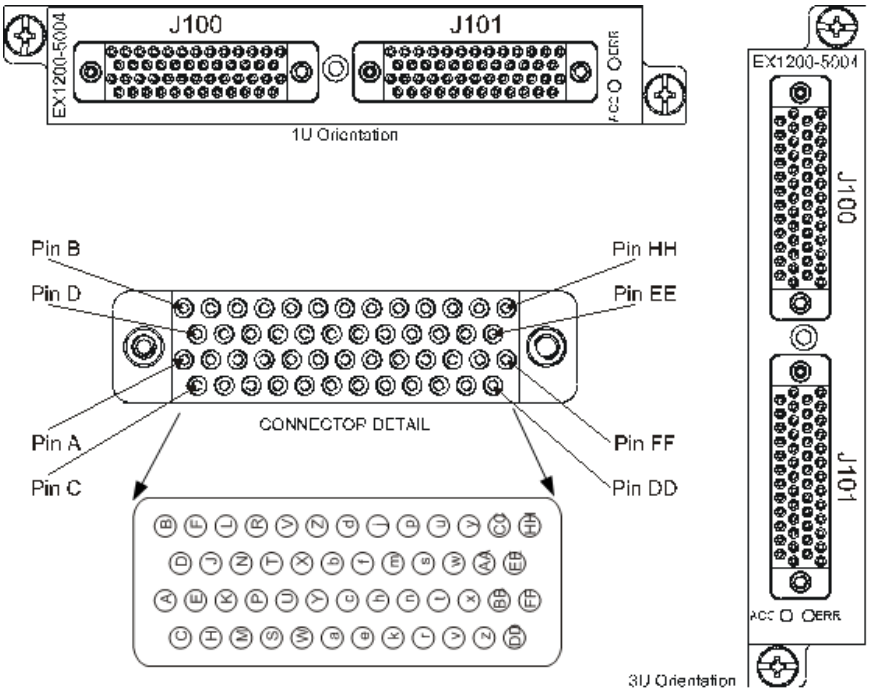


FIGURE 4-45: EX1200-5004 FRONT PANEL (FRONT VIEW)

J100				J101			
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
A	UNUSED	**d**	CH_31NC	**A**	UNUSED	**d**	CH_30NC
B	CH_3NO	**e**	CH_14NO	**B**	CH_18NC	**e**	CH_27NC
C	CH_10NO	**f**	CH_4NC	**C**	CH_15NO	**f**	CH_11NC
D	CH_31COM	**h**	CH_12NC	**D**	CH_29NC	**h**	CH_26NO
E	CH_6COM	**j**	CH_18NO	**E**	CH_17COM	**j**	CH_29COM
F	CH_1COM	**k**	CH_13NC	**F**	CH_11NO	**k**	CH_25NC
H	CH_8NO	**m**	CH_17NC	**H**	CH_21NC	**m**	CH_30COM
J	CH_2NC	**n**	CH_10COM	**J**	CH_17NO	**n**	CH_22NC
K	CH_6NO	**p**	CH_5NO	**K**	CH_16COM	**p**	CH_19COM
L	CH_2COM	**r**	CH_15NC	**L**	CH_15COM	**r**	CH_28NO
M	CH_8COM	**s**	CH_13NO	**M**	CH_23COM	**s**	CH_24COM
N	CH_7NC	**t**	CH_13COM	**N**	CH_24NA	**t**	CH_22COM
P	CH_5NC	**u**	CH_1NO	**P**	CH_16NO	**u**	CH_32NO
R	CH_14COM	**v**	CH_5COM	**R**	CH_28COM	**v**	CH_19NC
S	CH_4NO	**w**	CH_12COM	**S**	CH_21COM	**w**	CH_22NO
T	CH_4COM	**x**	CH_26NC	**T**	CH_20COM	**x**	CH_20NO
U	CH_3NC	**y**	CH_8NC	**U**	CH_25COM	**y**	CH_23NO
V	CH_31NO	**z**	CH_9NO	**V**	CH_30NO	**z**	CH_20NC
W	CH_7COM	**AA**	CH_12NO	**W**	CH_23NC	**AA**	CH_27COM
X	CH_3COM	**BB**	CH_9COM	**X**	CH_11COM	**BB**	CH_19NO
Y	CH_9NC	**CC**	CH_14NC	**Y**	CH_27NO	**CC**	CH_29NO
Z	CH_18COM	**DD**	CH_16NC	**Z**	CH_28NC	**DD**	CH_21NO
a	CH_7NO	**EE**	CH_2NO	**a**	CH_26COM	**EE**	CH_32COM
b	CH_10NC	**FF**	UNUSED	**b**	CH_24NC	**FF**	UNUSED
c	CH_6NC	**HH**	CH_1NC	**c**	CH_25NO	**HH**	CH_32NC

TABLE 4-43: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

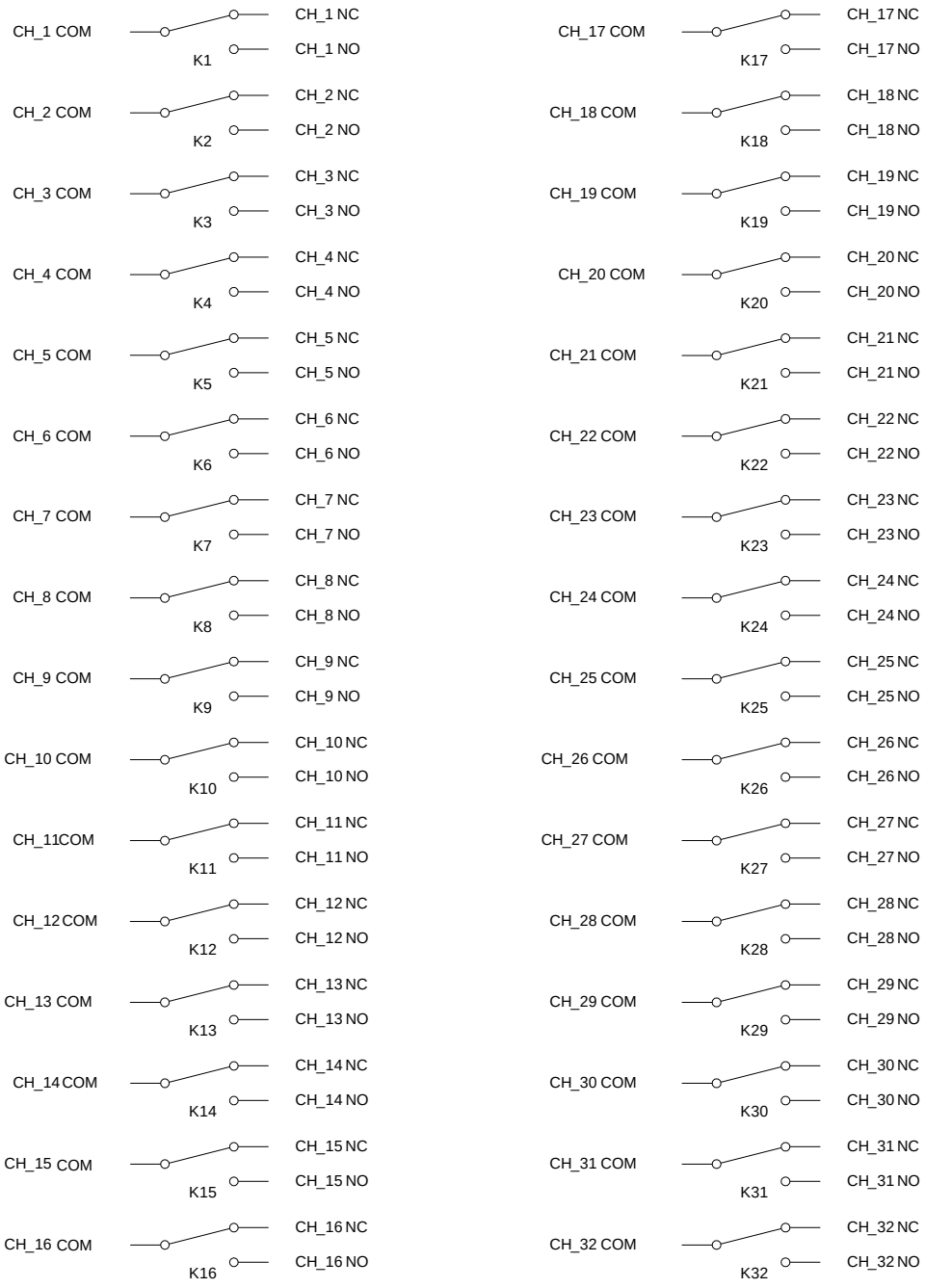


FIGURE 4-46: EX1200-5004 LOGICAL DIAGRAM

EX1200-5004 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	32 SPDT
MAXIMUM SWITCHING VOLTAGE	
	250 V ac rms, 110 V dc
MAXIMUM SWITCHING CURRENT	
	5 A
MAXIMUM SWITCHING POWER	
	150 W dc, 1250 VA per channel 18 kW per switch module
MINIMUM CONTACT RATING*	
	10 mA, 5 V dc
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^7
Electrical	5×10^5
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 0.15 Ω
INSULATION RESISTANCE	
	> 1×10^9 Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 7 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 80 pF
BANDWIDTH (-3 DB)	
	50 MHz (typical)
CROSSTALK (TYPICAL)	
100 kHz	< -80 dB
1 MHz	< -60 dB
10 MHz	< -40 dB
ISOLATION (TYPICAL)	
100 kHz	< -50 dB
1 MHz	< -45 dB
10 MHz	< -40 dB
INSERTION LOSS (TYPICAL)	
100 kHz	< 0.1 dB
1 MHz	< 0.2 dB
10 MHz	< 1.0 dB

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-5006 PLUG-IN MODULE

40-CHANNEL 2 AMP FORM A (SPST) SWITCH

The EX1200-5006 is a high-density general purpose 2 A switch modules designed for systems where individual relays can be used to route signals to/from the units under test (UUT), or combined externally to form user-defined configurations. These relays are commonly used to create complex signal distribution networks that can be reconfigured through different wiring in test adapters. Up to 240 SPST relays can be accommodated in a 1U full-rack mainframe for maximum density. The modules can also be configured with other EX1200 series switch modules as part of a flexible system switch design.

Since these modules may be used to switch power to the UUT or interface, the digital input lines on the EX1200 series mainframes support the ability to force all relays automatically to their normally open state if a fault condition occurs. This approach instantly removes all power to the UUT or interface. These modules can be automatically configured in the setup phase at the beginning of each scan step to facilitate test sequencing and control.

The EX1200-5006 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-8 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver.

CONNECTOR PINS AND SIGNALS

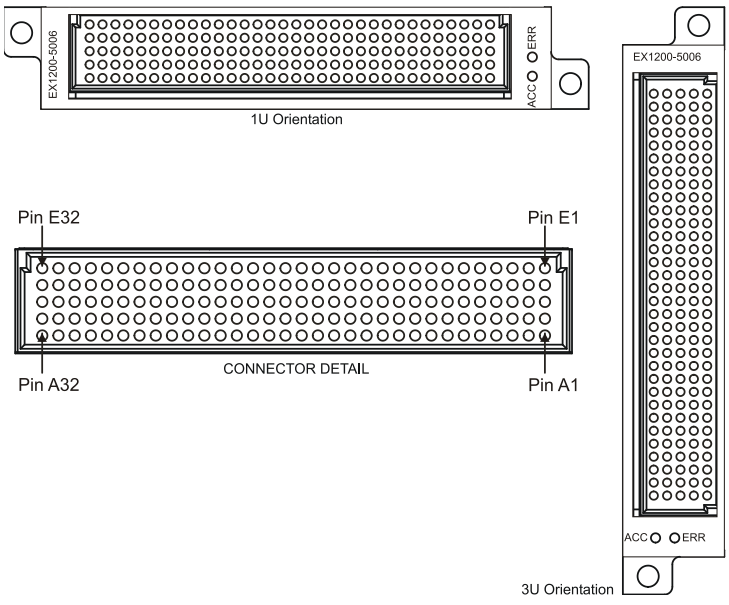


FIGURE 4-47: EX1200-5006 FRONT PANEL (FRONT VIEW)

Row A		Row B		Row C		Row D		Row E	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	CH_1NO	**1**	CH_2NO	**1**	CH_3NO	**1**	CH_4NO	**1**	CH_5NO
2	CH_1COM	**2**	CH_2COM	**2**	CH_3COM	**2**	CH_4COM	**2**	CH_5COM
3	CH_6NO	**3**	CH_7NO	**3**	CH_8NO	**3**	CH_9NO	**3**	CH_10NO
4	CH_6COM	**4**	CH_7COM	**4**	CH_8COM	**4**	CH_9COM	**4**	CH_10COM
5	CH_11NO	**5**	CH_12NO	**5**	CH_13NO	**5**	CH_14NO	**5**	CH_15NO
6	CH_11COM	**6**	CH_12COM	**6**	CH_13COM	**6**	CH_14COM	**6**	CH_15COM
7	CH_16NO	**7**	CH_17NO	**7**	CH_18NO	**7**	CH_19NO	**7**	CH_20NO
8	CH_16COM	**8**	CH_17COM	**8**	CH_18COM	**8**	CH_19COM	**8**	CH_20COM
9	CH_21NO	**9**	CH_22NO	**9**	CH_23NO	**9**	CH_24NO	**9**	CH_25NO
10	CH_21COM	**10**	CH_22COM	**10**	CH_23COM	**10**	CH_24COM	**10**	CH_25COM
11	CH_26NO	**11**	CH_27NO	**11**	CH_28NO	**11**	CH_29NO	**11**	CH_30NO
12	CH_26COM	**12**	CH_27COM	**12**	CH_28COM	**12**	CH_29COM	**12**	CH_30COM
13	CH_31NO	**13**	CH_32NO	**13**	CH_33NO	**13**	CH_34NO	**13**	CH_35NO
14	CH_31COM	**14**	CH_32COM	**14**	CH_33COM	**14**	CH_34COM	**14**	CH_35COM
15	CH_36NO	**15**	CH_37NO	**15**	CH_38NO	**15**	CH_39NO	**15**	CH_40NO
16	CH_36COM	**16**	CH_37COM	**16**	CH_38COM	**16**	CH_39COM	**16**	CH_40COM
17	UNUSED	**17**	UNUSED	**17**	UNUSED	**17**	UNUSED	**17**	UNUSED
18	UNUSED	**18**	UNUSED	**18**	UNUSED	**18**	UNUSED	**18**	UNUSED
19	UNUSED	**19**	UNUSED	**19**	UNUSED	**19**	UNUSED	**19**	UNUSED
20	UNUSED	**20**	UNUSED	**20**	UNUSED	**20**	UNUSED	**20**	UNUSED
21	UNUSED	**21**	UNUSED	**21**	UNUSED	**21**	UNUSED	**21**	UNUSED
22	UNUSED	**22**	UNUSED	**22**	UNUSED	**22**	UNUSED	**22**	UNUSED
23	UNUSED	**23**	UNUSED	**23**	UNUSED	**23**	UNUSED	**23**	UNUSED
24	UNUSED	**24**	UNUSED	**24**	UNUSED	**24**	UNUSED	**24**	UNUSED
25	UNUSED	**25**	UNUSED	**25**	UNUSED	**25**	UNUSED	**25**	UNUSED
26	UNUSED	**26**	UNUSED	**26**	UNUSED	**26**	UNUSED	**26**	UNUSED
27	UNUSED	**27**	UNUSED	**27**	UNUSED	**27**	UNUSED	**27**	UNUSED
28	UNUSED	**28**	UNUSED	**28**	UNUSED	**28**	UNUSED	**28**	UNUSED
29	UNUSED	**29**	UNUSED	**29**	UNUSED	**29**	UNUSED	**29**	UNUSED
30	UNUSED	**30**	UNUSED	**30**	UNUSED	**30**	UNUSED	**30**	UNUSED
31	UNUSED	**31**	UNUSED	**31**	UNUSED	**31**	UNUSED	**31**	UNUSED
32	UNUSED	**32**	UNUSED	**32**	UNUSED	**32**	UNUSED	**32**	UNUSED

TABLE 4-44: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

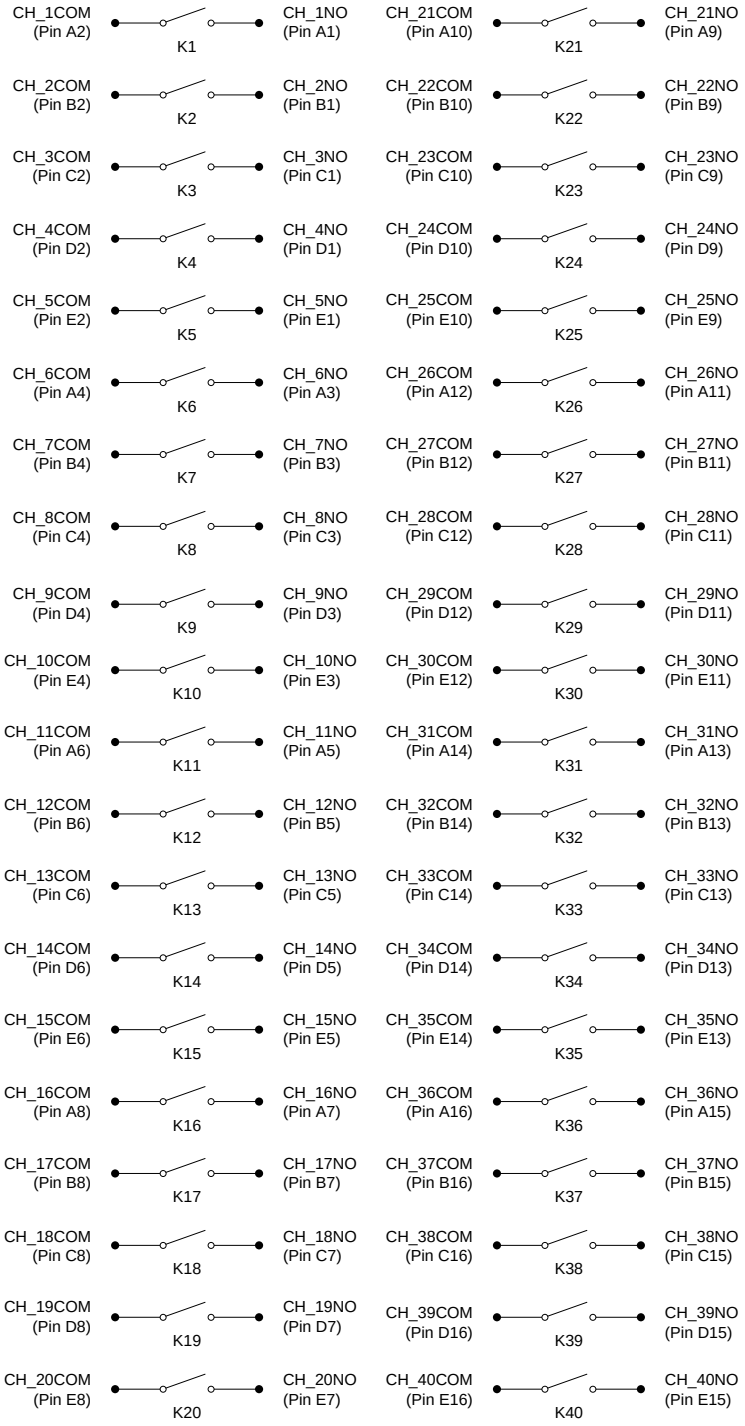


FIGURE 4-48: EX1200-5006 LOGICAL DIAGRAM

TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin	TB Ref	Signal	Conn Pin
T1	CH_5COM	E2	T41	CH_36NO	A15	T81	CH_33COM	C14	T121	UNUSED	N/A
T2	CH_4COM	D2	T42	CH_31COM	A14	T82	CH_32COM	B14	T122	UNUSED	N/A
T3	CH_10NO	E3	T43	CH_31NO	A13	T83	CH_38NO	C15	T123	UNUSED	N/A
T4	CH_9NO	D3	T44	CH_26COM	A12	T84	CH_37NO	B15	T124	UNUSED	N/A
T5	CH_10COM	E4	T45	CH_21COM	A10	T85	CH_38COM	C16	T125	UNUSED	N/A
T6	CH_9COM	D4	T46	CH_24COM	D10	T86	CH_37COM	B16	T126	UNUSED	N/A
T7	CH_15NO	E5	T47	CH_25COM	E10	T87	UNUSED	N/A	T127	UNUSED	N/A
T8	CH_14NO	D5	T48	CH_28NO	C11	T88	UNUSED	N/A	T128	UNUSED	N/A
T9	CH_15COM	E6	T49	CH_27NO	B11	T89	UNUSED	N/A	T129	UNUSED	N/A
T10	CH_14COM	D6	T50	CH_26NO	A11	T90	UNUSED	N/A	T130	UNUSED	N/A
T11	CH_20NO	E7	T51	CH_27COM	B12	T91	UNUSED	N/A	T131	UNUSED	N/A
T12	CH_19NO	D7	T52	CH_28COM	C12	T92	UNUSED	N/A	T132	UNUSED	N/A
T13	CH_20COM	E8	T53	CH_32NO	B13	T93	UNUSED	N/A	T133	UNUSED	N/A
T14	CH_19COM	D8	T54	CH_33NO	C13	T94	UNUSED	N/A	T134	UNUSED	N/A
T15	CH_25NO	E9	T55	CH_21NO	A9	T95	UNUSED	N/A	T135	UNUSED	N/A
T16	CH_24NO	D9	T56	CH_16COM	A8	T96	CH_5NO	E1	T136	UNUSED	N/A
T17	CH_8NO	C3	T57	CH_16NO	A7	T97	UNUSED	N/A	T137	UNUSED	N/A
T18	CH_7NO	B3	T58	CH_11COM	A6	T98	UNUSED	N/A	T138	UNUSED	N/A
T19	CH_3COM	C2	T59	CH_11NO	A5	T99	UNUSED	N/A	T139	UNUSED	N/A
T20	CH_2COM	B2	T60	CH_6COM	A4	T100	UNUSED	N/A	T140	UNUSED	N/A
T21	CH_8COM	C4	T61	CH_6NO	A3	T101	UNUSED	N/A	T141	UNUSED	N/A
T22	CH_7COM	B4	T62	CH_1COM	A2	T102	UNUSED	N/A	T142	UNUSED	N/A
T23	CH_13NO	C5	T63	CH_22COM	B10	T103	UNUSED	N/A	T143	UNUSED	N/A
T24	CH_12NO	B5	T64	CH_23COM	C10	T104	UNUSED	N/A	T144	UNUSED	N/A
T25	CH_13COM	C6	T65	CH_40NO	E15	T105	UNUSED	N/A	T145	UNUSED	N/A
T26	CH_12COM	B6	T66	CH_39NO	D15	T106	UNUSED	N/A	T146	UNUSED	N/A
T27	CH_18NO	C7	T67	CH_40COM	E16	T107	UNUSED	N/A	T147	UNUSED	N/A
T28	CH_17NO	B7	T68	CH_39COM	D16	T108	UNUSED	N/A	T148	UNUSED	N/A
T29	CH_18COM	C8	T69	UNUSED	N/A	T109	UNUSED	N/A	T149	UNUSED	N/A
T30	CH_17COM	B8	T70	UNUSED	N/A	T110	UNUSED	N/A	T150	UNUSED	N/A
T31	CH_23NO	C9	T71	UNUSED	N/A	T111	UNUSED	N/A	T151	UNUSED	N/A
T32	CH_22NO	B9	T72	UNUSED	N/A	T112	UNUSED	N/A	T152	UNUSED	N/A
T33	CH_30NO	E11	T73	UNUSED	N/A	T113	UNUSED	N/A	T153	UNUSED	N/A
T34	CH_29NO	D11	T74	UNUSED	N/A	T114	UNUSED	N/A	T154	UNUSED	N/A
T35	CH_29COM	D12	T75	UNUSED	N/A	T115	UNUSED	N/A	T155	UNUSED	N/A
T3	CH_30COM	E12	T76	UNUSED	N/A	T116	UNUSED	N/A	T156	CH_2NO	B1
T37	CH_34NO	D13	T77	CH_4NO	D1	T117	UNUSED	N/A	T157	UNUSED	N/A
T38	CH_35NO	E13	T78	UNUSED	N/A	T118	UNUSED	N/A	T158	CH_1NO	A1
T39	CH_34COM	D14	T79	UNUSED	N/A	T119	UNUSED	N/A	T159	UNUSED	N/A
T40	CH_35COM	E14	T80	UNUSED	N/A	T120	UNUSED	N/A	T160	CH_3NO	C1

TABLE 4-45: EX1200-TB160SE TERMINAL BLOCK TO EX1200-5006 PIN MAPPING

EX1200-5006 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	40 SPST / 20 DPST
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	300 V dc, 300 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	60 W dc, 125 VA
**Maximum switched power is at 30 V/ 2 A dc. Max switched power is derated non-linearly as voltage is increased.*	
MINIMUM CONTACT RATING*	
	10 mV dc, 10 µA (resistive)
**This value is in reference to a resistive load. Minimum capacity changes depending on switching frequency and environmental conditions*	
RATED SWITCH OPERATIONS	
Mechanical	1×10^8 (no load)
Electrical	1×10^6 @ 50 V dc, 0.1 A resistive or 10 V dc, 10 mA (resistive)
SWITCHING TIME	
	< 3 ms
PATH RESISTANCE	
	< 300 mΩ
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET PER CHANNEL (HI-LO)	
	< 1 µV
CAPACITANCE	
Open channel	< 50 pF
Channel-mainframe	< 80 pF
High-low	< 50 pF
BANDWIDTH (-3 dB)	
	80 MHz (typical)
CROSSTALK (TYPICAL)	
100 kHz	< -55 dB
1 MHz	< -45 dB
ISOLATION (TYPICAL)	
100 kHz	< -50 dB
1 MHz	< -35 dB

EX1200-6101 PLUG-IN MODULE

10 SP4T RF MULTIPLEXERS, 1.3 GHZ

The EX1200-6101 is a high-density RF switch module with ten individual SP4T coaxial trees that are isolated from each other and system ground to provide a high-fidelity switch path for switching signals in excess of 1.3 GHz. Excellent crosstalk and isolation is maintained by using very short low-loss coaxial runs from the connector directly to the relays. All modules are also configured to avoid any unterminated stub effects, improving overall signal integrity and allowing for high frequency matrix designs and large multiplexer configurations while preserving bandwidth and maintaining low VSWR. The front panel utilizes two high-density, 26-pin coaxial connectors designed for high reliability and low insertion loss.

Six of the modules can be accommodated in a 1U EX1200 full rack mainframe to provide a very flexible RF switch network. For example, a single module can be configured through external cabling to provide dual 1 x 16 multiplexers into two channels of a scope, or as a single 4 x 4 RF matrix. The modules can also be combined with other EX1200 switch cards to configure a general purpose subsystem to switch dc to > 1.3 GHz.

The EX1200-6101 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-0 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available.

CONNECTOR PINS AND SIGNALS

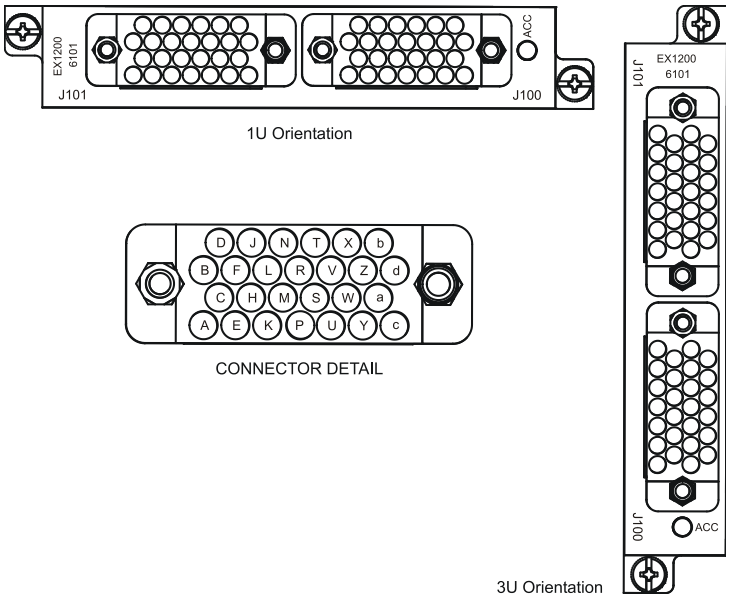


FIGURE 4-49: EX1200-6101 FRONT PANEL (FRONT VIEW)

J101		J100	
Pin	**Signal**	**Pin**	**Signal**
A	CH1_NO3	**A**	CH6_NO3
B	CH3_NO3	**B**	CH8_NO3
C	CH2_NO3	**C**	CH7_NO3
D	CH4_NO3	**D**	CH9_NO3
E	CH1_COM	**E**	CH6_COM
F	CH3_COM	**F**	CH8_COM
H	CH2_COM	**H**	CH7_COM
J	CH4_COM	**J**	CH9_COM
K	CH1_NC	**K**	CH6_NC
L	CH3_NC	**L**	CH8_NC
M	CH2_NC	**M**	CH7_NC
N	CH4_NC	**N**	CH9_NC
P	CH1_NO1	**P**	CH6_NO1
R	CH3_NO1	**R**	CH8_NO1
S	CH2_NO1	**S**	CH7_NO1
T	CH4_NO1	**T**	CH9_NO1
U	CH1_NO2	**U**	CH6_NO2
V	CH3_NO2	**V**	CH8_NO2
W	CH2_NO2	**W**	CH7_NO2
X	CH4_NO2	**X**	CH9_NO2
Y	CH5_NC	**Y**	CH10_NC
Z	CH5_NO1	**Z**	CH10_NO1
a	CH5_NO2	**a**	CH10_NO2
b	CH5_NO3	**b**	CH10_NO3
c	CH5_COM	**c**	CH10_COM
d	UNUSED	**d**	UNUSED

TABLE 4-46: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

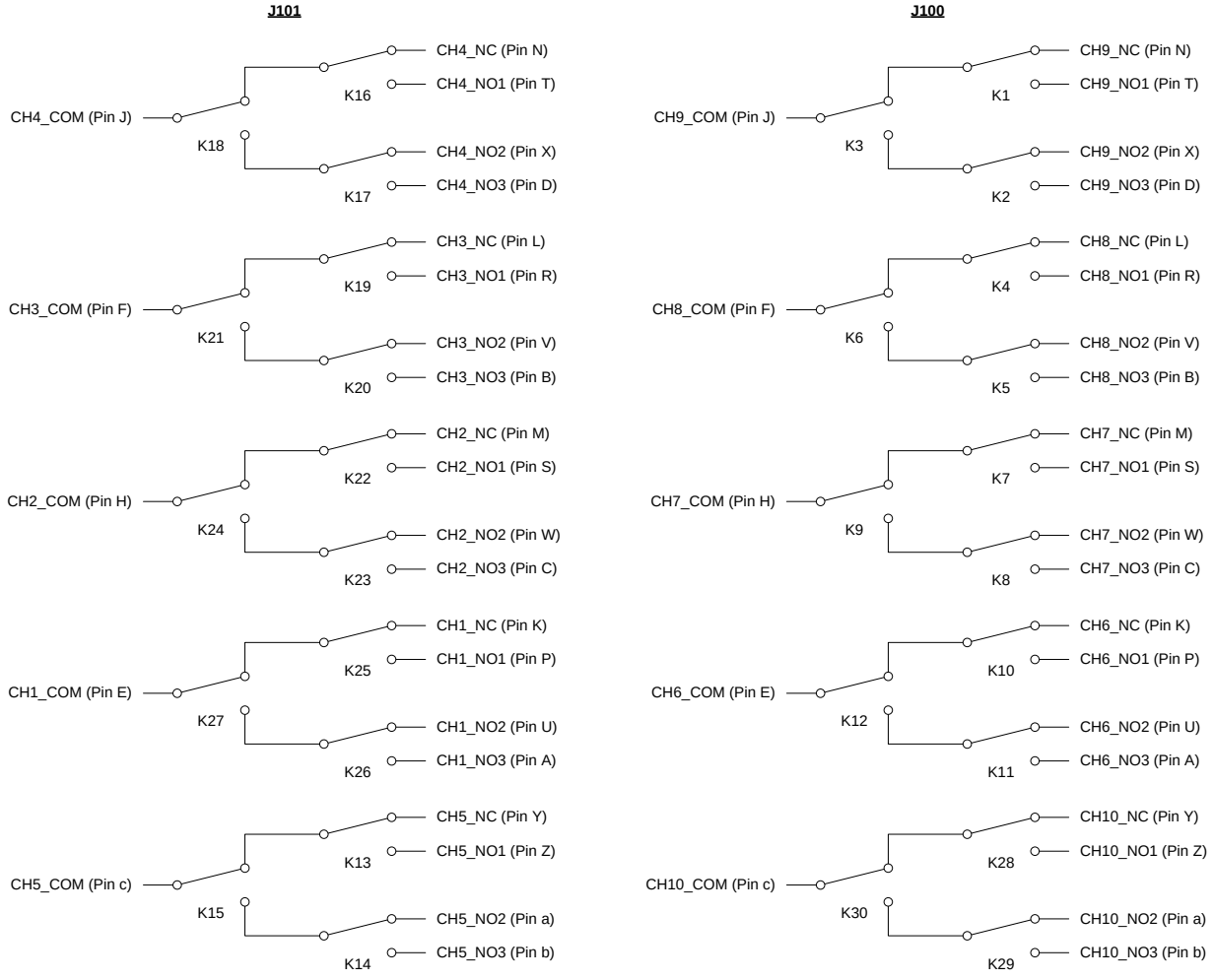


FIGURE 4-50: EX1200-6101 LOGICAL DIAGRAM

EX1200-6101 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	10 SP4T multiplexers
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V dc, 250 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	50 W, 62.5 VA
RATED SWITCH OPERATIONS	
Mechanical	5×10^6
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 0.250 Ω
INSULATION RESISTANCE	
	> 1×10^9 Ω
BANDWIDTH (-3 dB)	
	1.3 GHz (typical)
INSERTION LOSS (TYPICAL)	
500 MHz	< 0.9 dB
1.3 GHz	< 3.0 dB
CROSSTALK (TYPICAL)	
500 MHz	< -70 dB
1.3 GHz	< -60 dB
ISOLATION (TYPICAL)	
500 MHz	< -70 dB
1.3 GHz	< -60 dB
VSWR (TYPICAL)	
500 MHz	< 1.11:1
1.3 GHz	< 2.92:1

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-6102 PLUG-IN MODULE

17-CHANNEL (1X2) COAXIAL SWITCHES, 1.3GHZ

The EX1200-6102 is a high-density RF switch module designed for high-fidelity RF switching applications up to 1.3 GHz. Excellent crosstalk and isolation is maintained by using RF relays with bandwidths in excess of 2.0 GHz, along with short, low-loss coaxial runs from connector directly to relays. All modules are also configured to avoid any unterminated stub effects, improving overall signal integrity, and allowing for high frequency matrix designs and larger multiplexer configurations while maintaining bandwidth and VSWR.

The EX1200-6102 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4- provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available.

CONNECTOR PINS AND SIGNALS

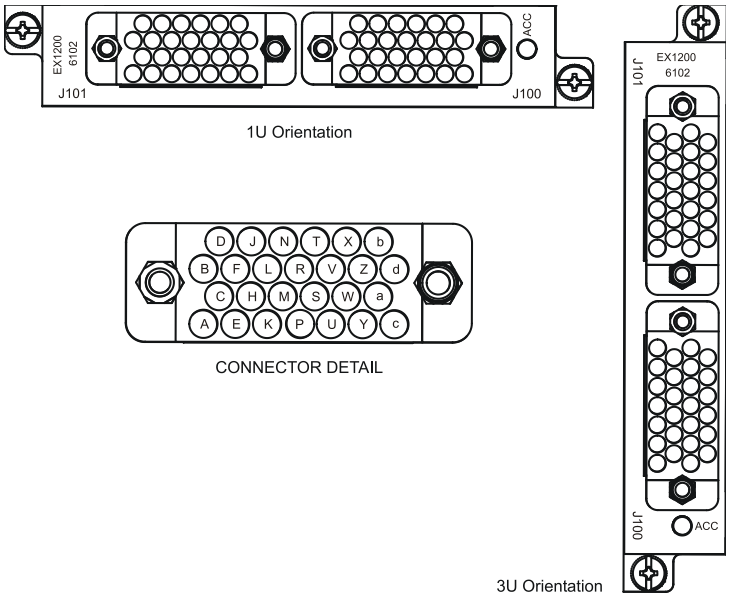


FIGURE 4-51: EX1200-6102 FRONT PANEL (FRONT VIEW)

J101		J100	
Pin	**Signal**	**Pin**	**Signal**
A	CH_9NC	**A**	CH_1NC
B	CH_10NC	**B**	CH_2NC
C	CH_11NC	**C**	CH_3NC
D	CH_12NC	**D**	CH_4NC
E	CH_9COM	**E**	CH_1COM
F	CH_10COM	**F**	CH_2COM
H	CH_11COM	**H**	CH_3COM
J	CH_12COM	**J**	CH_4COM
K	CH_9NO	**K**	CH_1NO
L	CH_10NO	**L**	CH_2NO
M	CH_11NO	**M**	CH_3NO
N	CH_12NO	**N**	CH_4NO
P	CH_13NC	**P**	CH_5NC
R	CH_14NC	**R**	CH_6NC
S	CH_15NC	**S**	CH_7NC
T	CH_16NC	**T**	CH_8NC
U	CH_13COM	**U**	CH_5COM
V	CH_14COM	**V**	CH_6COM
W	CH_15COM	**W**	CH_7COM
X	CH_16COM	**X**	CH_8COM
Y	CH_13NO	**Y**	CH_5NO
Z	CH_14NO	**Z**	CH_6NO
a	CH_15NO	**a**	CH_7NO
b	CH_16NO	**b**	CH_8NO
c	CH_17NC	**c**	CH_17NO
d	UNUSED	**d**	CH_17COM

TABLE 4-47: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

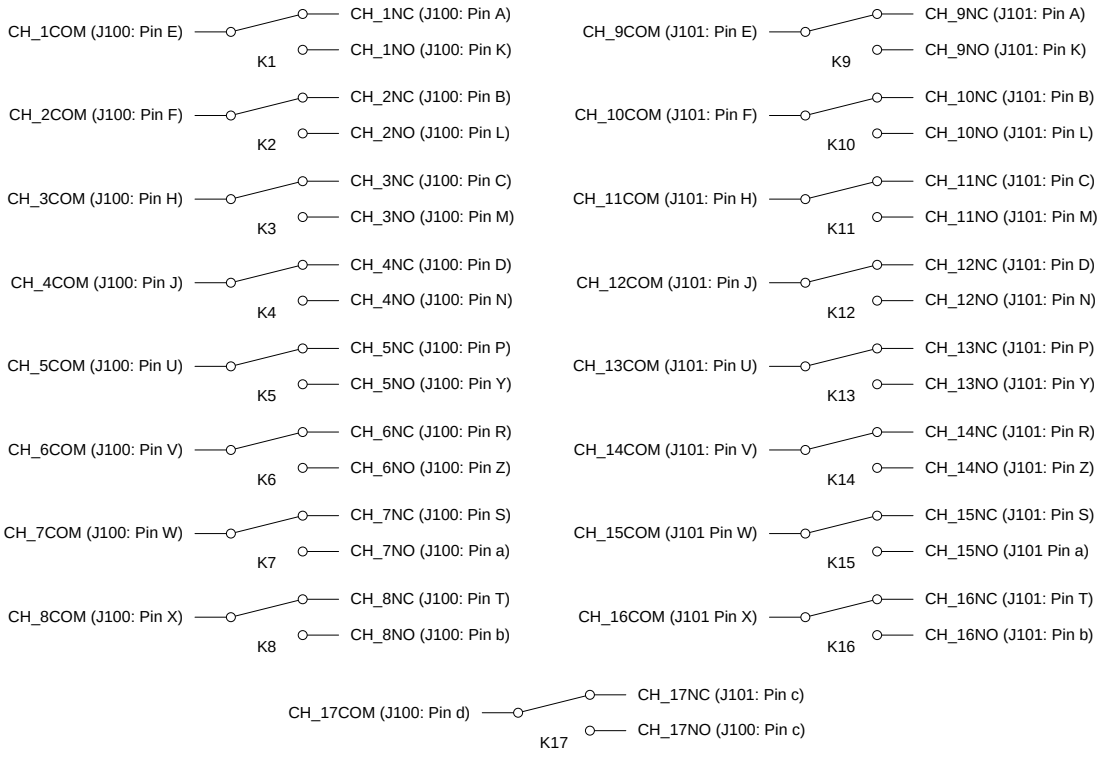


FIGURE 4-52: EX1200-6102 LOGICAL DIAGRAM

EX1200-6102 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	17 SPDT
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	30 V dc
MAXIMUM SWITCHING CURRENT	
	0.5 A
MAXIMUM CARRY CURRENT	
	0.5 A
MAXIMUM SWITCHING POWER	
	10 W
RATED SWITCH OPERATIONS	
Mechanical	5×10^6
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 1 Ω
INSULATION RESISTANCE	
	$> 1 \times 10^9$ Ω
BANDWIDTH (-3 dB)	
	1.3 GHz (typical)
INSERTION LOSS (TYPICAL)	
100 MHz	< 0.2 dB
500 MHz	< 0.5 dB
1.3 GHz	< 2.0 dB
CROSSTALK (TYPICAL)	
10 MHz	< -70 dB
100 MHz	< -65 dB
500 MHz	< -60 dB
1.3 GHz	< -55 dB
ISOLATION (TYPICAL)	
10 MHz	< -80 dB
100 MHz	< -70 dB
500 MHz	< -65 dB
1.3 GHz	< -55 dB
VSWR (TYPICAL)	
100 MHz	< 1.2:1
1.3 GHz	< 1.5:1

For mating connector, crimp pins, and other accessories, please refer to *Appendix B.*

EX1200-6111 PLUG-IN MODULE

5-CHANNEL SP4T COAXIAL SWITCH

The EX1200-6111 is a high-density RF switch module with ten individual SP4T coaxial trees that are isolated from each other and system ground to provide a high-fidelity switch path for switching signals in excess of 1.3 GHz. Excellent crosstalk and isolation is maintained by using very short low-loss coaxial runs from the connector directly to the relays. All modules are also configured to avoid any unterminated stub effects, improving overall signal integrity and allowing for high frequency matrix designs and large multiplexer configurations while preserving bandwidth and maintaining low VSWR. The front panel utilizes a high-density, 26-pin coaxial connectors designed for high reliability and low insertion loss.

Six of the modules can be accommodated in a 1U EX1200 full rack mainframe to provide a very flexible RF switch network. For example, a single module can be configured through external cabling to provide dual 1 x 16 multiplexers into two channels of a scope, or as a single 4 x 4 RF matrix. The modules can also be combined with other EX1200 switch cards to configure a general purpose subsystem to switch dc to > 1.3 GHz.

The EX1200-6111 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-4 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available.

CONNECTOR PINS AND SIGNALS

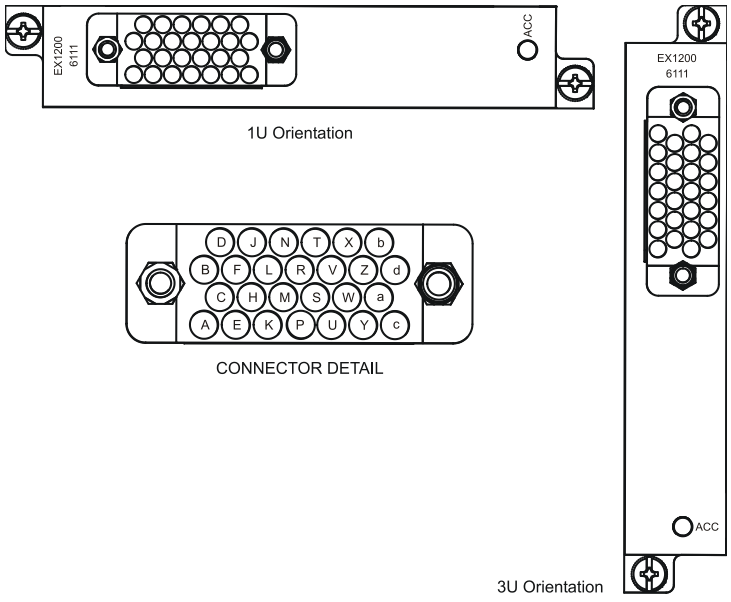


FIGURE 4-53: EX1200-6111 FRONT PANEL (FRONT VIEW)

Pin	Signal
A	CH1_NO3
B	CH3_NO3
C	CH2_NO3
D	CH4_NO3
E	CH1_COM
F	CH3_COM
H	CH2_COM
J	CH4_COM
K	CH1_NC
L	CH3_NC
M	CH2_NC
N	CH4_NC
P	CH1_NO1
R	CH3_NO1
S	CH2_NO1
T	CH4_NO1
U	CH1_NO2
V	CH3_NO2
W	CH2_NO2
X	CH4_NO2
Y	CH5_NC
Z	CH5_NO1
a	CH5_NO2
b	CH5_NO3
c	CH5_COM
d	UNUSED

TABLE 4-48: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

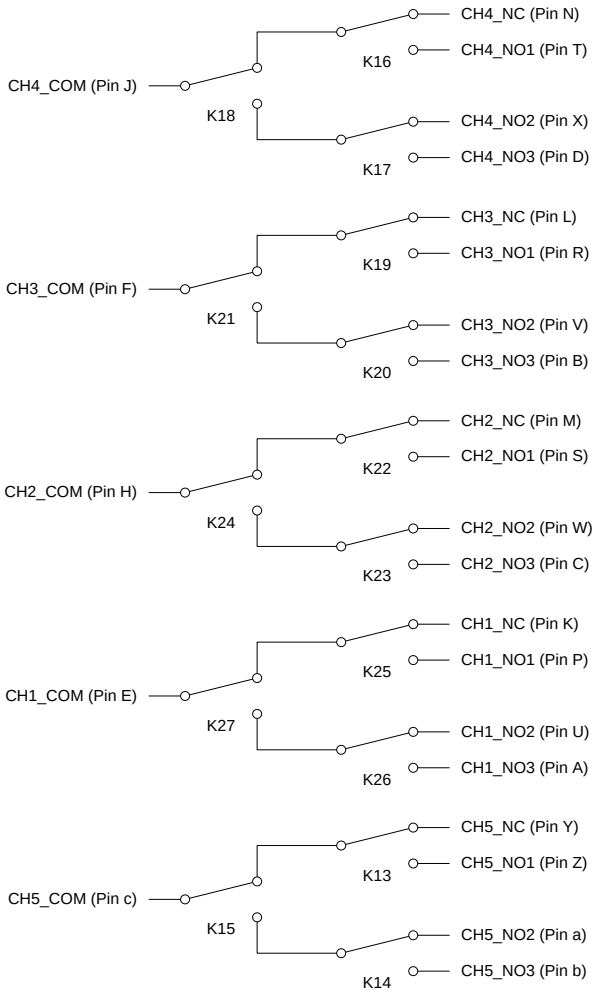


FIGURE 4-54: EX1200-6111 LOGICAL DIAGRAM

EX1200-6111 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	5 SP4T multiplexers
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V dc, 250 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	50 W, 62.5 VA
RATED SWITCH OPERATIONS	
Mechanical	5×10^6
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 0.250 Ω
INSULATION RESISTANCE	
	> 1×10^9 Ω
BANDWIDTH (-3 dB)	
	1.3 GHz (typical)
INSERTION LOSS (TYPICAL)	
500 MHz	< 0.9 dB
1.3 GHz	< 3.0 dB
CROSSTALK (TYPICAL)	
500 MHz	< -70 dB
1.3 GHz	< -60 dB
ISOLATION (TYPICAL)	
500 MHz	< -70 dB
1.3 GHz	< -60 dB
VSWR (TYPICAL)	
500 MHz	< 1.11:1
1.3 GHz	< 2.92:1

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-6216 PLUG-IN MODULE

DUAL 1 X 16 RF MUX, 1 GHZ SWITCH

The EX1200-6216 is a high-density RF switch module configured as dual 1 x 16 coaxial trees that are isolated from each other and system ground to provide a high-fidelity switch path for switching signals in excess of 1 GHz in a 50 Ω environment. On-board jumpers can be added to connect all shields together or to system ground if desired. Excellent crosstalk and isolation is maintained by using very short low-loss coaxial runs from the connector directly to the relays.

All modules are also configured to avoid any unterminated stub effects. This improves overall signal integrity and allows for high frequency matrix designs or large multiplexer configurations while preserving bandwidth and maintaining low VSWR. The front panel utilizes two high-density, 26-pin coaxial connectors designed for high reliability and low insertion loss.

Six of the modules can be accommodated in a 1U EX1200 full rack mainframe to provide a very flexible RF switch network. The modules can also be combined with other EX1200 switch cards to configure a general purpose subsystem to switch dc to > 1 GHz.

The EX1200-6216 can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-6 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available.

CONNECTOR PINS AND SIGNALS

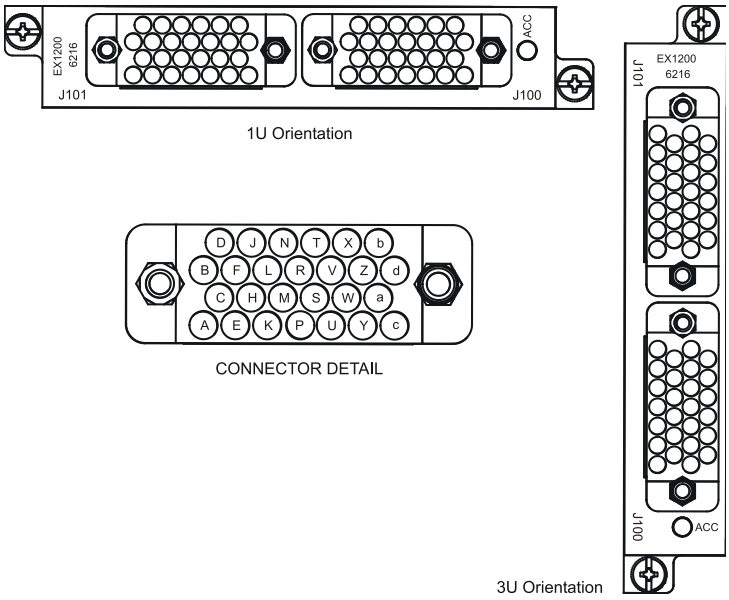


FIGURE 4-55: EX1200-6216 FRONT PANEL (FRONT VIEW)

J101		J100	
Pin	**Signal**	**Pin**	**Signal**
A	UNUSED	**A**	UNUSED
B	CH1_COM	**B**	CH2_COM
C	UNUSED	**C**	UNUSED
D	UNUSED	**D**	UNUSED
E	UNUSED	**E**	UNUSED
F	UNUSED	**F**	UNUSED
H	UNUSED	**H**	UNUSED
J	UNUSED	**J**	UNUSED
K	UNUSED	**K**	UNUSED
L	UNUSED	**L**	UNUSED
M	CH1_NO7	**M**	CH2_NO7
N	CH1_NO11	**N**	CH2_NO11
P	CH1_NO3	**P**	CH2_NO3
R	CH1_NO15	**R**	CH2_NO15
S	CH1_NO6	**S**	CH2_NO6
T	CH1_NO10	**T**	CH2_NO10
U	CH1_NO2	**U**	CH2_NO2
V	CH1_NO14	**V**	CH2_NO14
W	CH1_NO5	**W**	CH2_NO5
X	CH1_NO9	**X**	CH2_NO9
Y	CH1_NO1	**Y**	CH2_NO1
Z	CH1_NO13	**Z**	CH2_NO13
a	CH1_NO4	**a**	CH2_NO4
b	CH1_NO8	**b**	CH2_NO8
c	CH1_NC	**c**	CH2_NC
d	CH1_NO12	**d**	CH2_NO12

TABLE 4-49: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

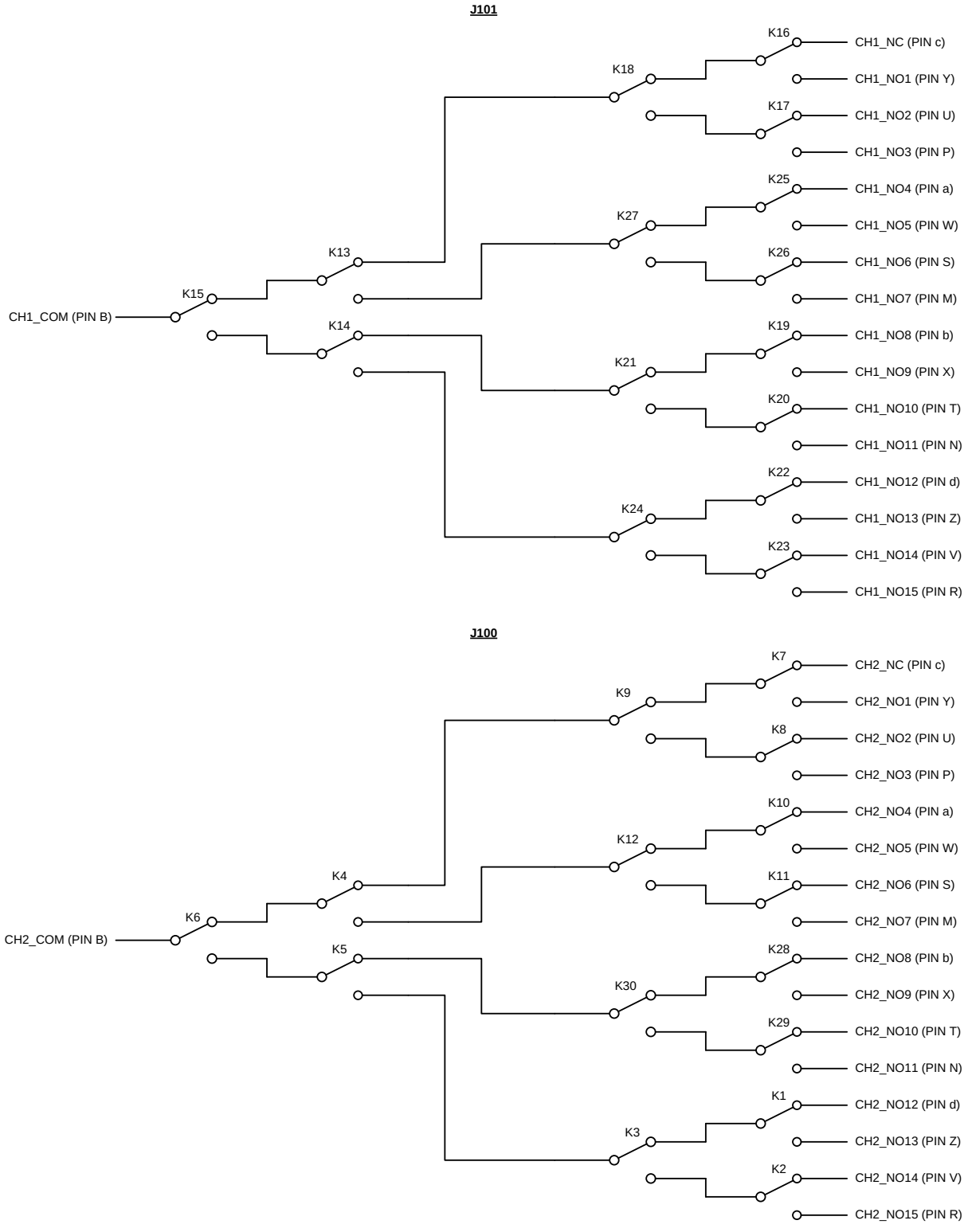


FIGURE 4-56: EX1200-6216 LOGICAL DIAGRAM

EX1200-6216 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Dual (1 x 16) 50 Ω RF multiplexers, 1 GHz
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	220 V dc, 250 V ac rms
MAXIMUM SWITCHING CURRENT	
	2 A
MAXIMUM SWITCHING POWER	
	50 W, 62.5 VA
RATED SWITCH OPERATIONS	
Mechanical	5×10^6
Electrical	1×10^5 at full load
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 500 mΩ
INSULATION RESISTANCE	
	> 1×10^9 Ω
BANDWIDTH (-3 dB)	
	1 GHz (typical)
INSERTION LOSS (TYPICAL)	
500 MHz	< 1.0 dB
1 GHz	< 3.0 dB
CROSSTALK (TYPICAL)	
500 MHz	< -75 dB
1 GHz	< -70 dB
ISOLATION (TYPICAL)	
500 MHz	< -75 dB
1 GHz	< -70 dB
VSWR (TYPICAL)	
500 MHz	< 1.4:1
1 GHz	< 2.5:1

For mating connector, crimp pins, and other accessories, please refer to *Appendix B*.

EX1200-6216HV PLUG-IN MODULE

DUAL (1X16) 500 V 250 MHZ MULTIPLEXERS

The EX1200-6216HV is an RF switch module designed in a star configuration. A star switch allows any channel to be connected to any other channel. This configuration approach also allows for the creation of simple matrices (i.e. 8 x 1 x 8).

Additionally, for applications that require the switching of high voltage probes or transient power supply signals, the EX1200-6216HV provides the capability of switching up to 500 V and up to 250 MHz.

The EX1200-621HV can be controlled programmatically using IviSwtch-compliant calls. Both path level programming and individual relay control are available. Refer to the host driver documentation for additional details. Figure 4-8 provides a logical diagram of the switch module and identifies the switches used by the module. This information can be used for individual relay control through the driver. Both single-wire and two-wire programming modes are available.

CONNECTOR PINS AND SIGNALS

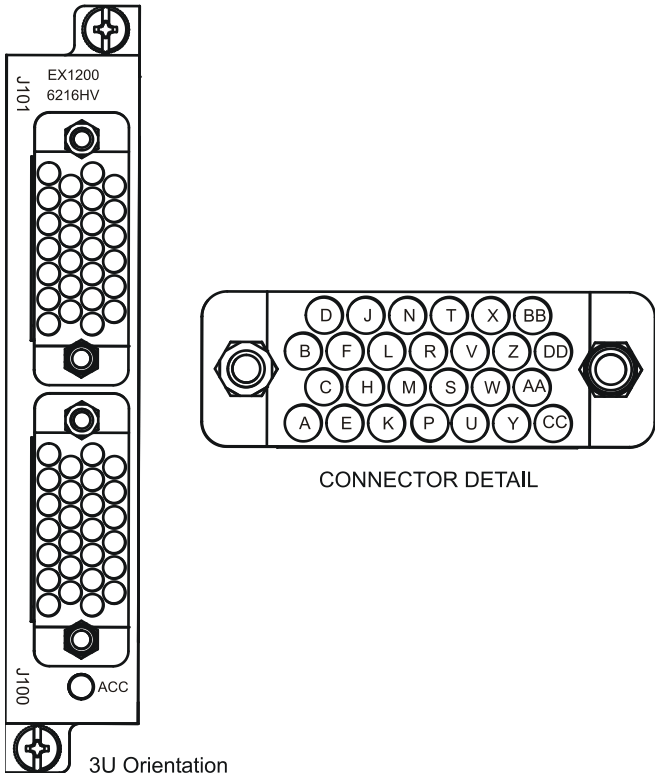


FIGURE 4-57: EX1200-6216HV FRONT PANEL (FRONT VIEW)

NOTE	This module is for use in the 3U EX1200 series mainframes only. This module contains ***position-sensitive, mercury switches***. This module must be installed in an upright position and this position must be maintained in order for these switches to function properly.

J101		J100	
Pin	**Signal**	**Pin**	**Signal**
A	CH1_1	**A**	CH1_9
B	CH2_1	**B**	CH2_9
C	CH1_5	**C**	CH1_13
D	CH2_5	**D**	CH2_13
E	CH1_2	**E**	CH1_10
F	CH2_2	**F**	CH2_10
H	CH1_6	**H**	CH1_14
J	CH2_6	**J**	CH2_14
K	CH1_3	**K**	CH1_11
L	CH2_3	**L**	CH2_11
M	CH1_7	**M**	CH1_15
N	CH2_7	**N**	CH2_15
P	CH1_4	**P**	CH1_12
R	CH2_4	**R**	CH2_12
S	CH1_8	**S**	CH1_16
T	CH2_8	**T**	CH2_16
U	UNUSED	**U**	UNUSED
V	UNUSED	**V**	UNUSED
W	UNUSED	**W**	UNUSED
X	UNUSED	**X**	UNUSED
Y	UNUSED	**Y**	UNUSED
Z	UNUSED	**Z**	UNUSED
AA	UNUSED	**AA**	CH1_CHASSIS
BB	UNUSED	**BB**	CH2_CHASSIS
CC	CH1_COM	**CC**	UNUSED
DD	CH2_COM	**DD**	UNUSED

TABLE 4-50: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

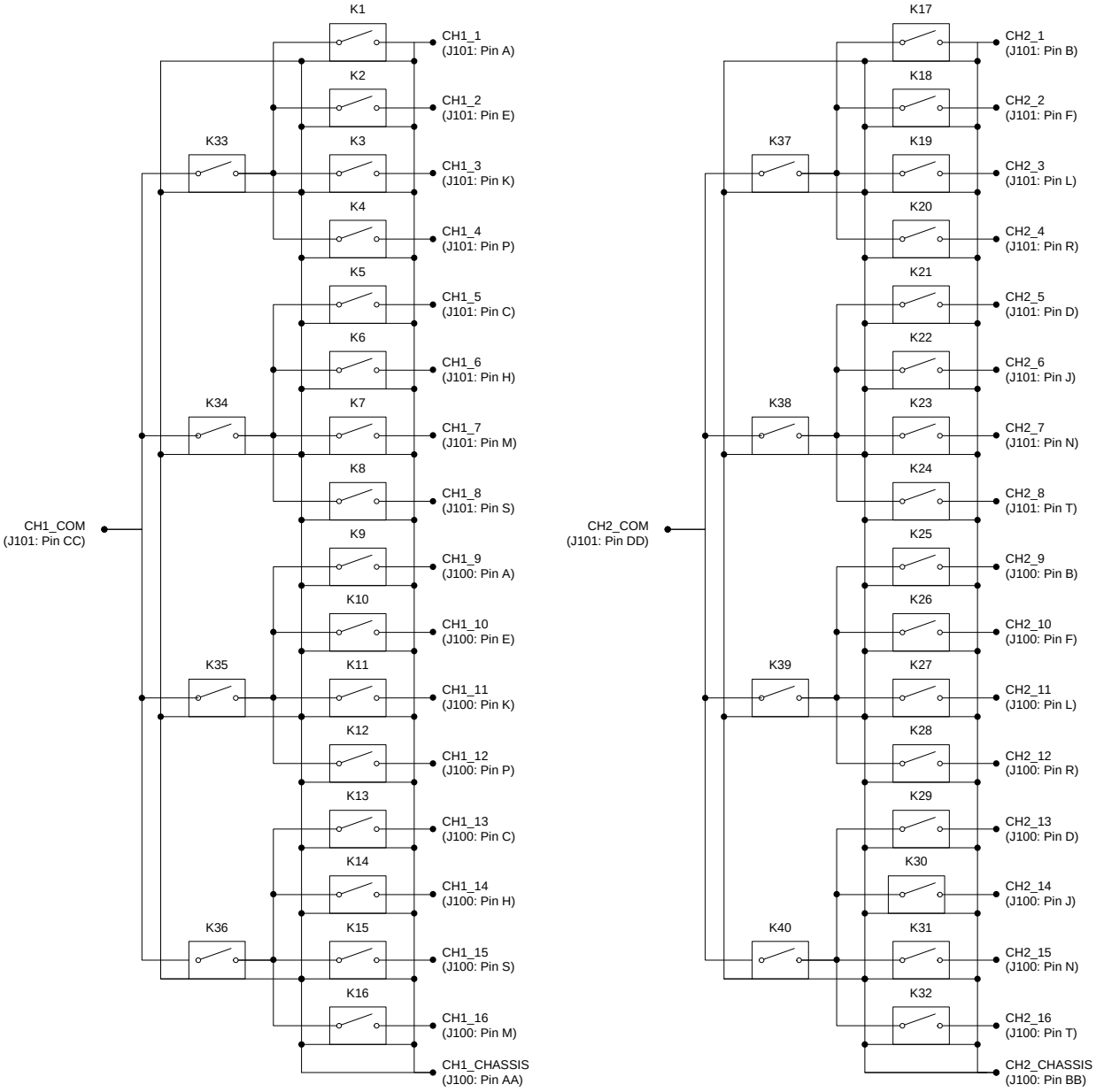


FIGURE 4-58: EX1200-6216HV LOGICAL DIAGRAM

EX1200-6216HV SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Two (1 x 16) multiplexer channels
RELAY TYPE	
	Reed
MAXIMUM SWITCHING VOLTAGE	
	500 V ac rms
MAXIMUM SWITCHING CURRENT	
	0.5 A
MAXIMUM CARRYING CURRENT	
	2.0 A
MAXIMUM SWITCHING POWER	
	10 W
RATED SWITCH OPERATIONS	
@ 1 V, 10 mA	100×10^6
SWITCHING TIME	
	< 1 ms
PATH RESISTANCE	
	< 500 mΩ (valid at 50 mV, 10 mA load)
BANDWIDTH (-3 dB)	
	250 MHz (typical)
INSERTION LOSS (TYPICAL)	
100 MHz	< 1.0 dB
250 MHz	< 3.0 dB
CROSSTALK (TYPICAL)	
100 MHz	< -45 dB
250 MHz	< -35 dB
ISOLATION (TYPICAL)	
100 MHz	< -45 dB
250 MHz	< -35 dB
VSWR (TYPICAL)	
100 MHz	< 1.2:1
250 MHz	< 1.5:1

EX1200-6301 PLUG-IN MODULE

4 CHANNEL SP4T, RF MULTIPLEXER, 50 Ω, 3 GHZ

The EX1200-6301 is designed with SMB male connectors for applications that require RF signal switching upto 3 GHz in a 50 Ω environment. Excellent crosstalk and isolation performance is achieved by using short low-loss coaxial runs from the connector directly to the relays. All modules are designed to avoid any unterminated stub effects improving overall signal integrity and enabling the construction of larger high frequency multiplexer configurations while maintaining bandwidth and VSWR.

Six of the modules can be accommodated in a single EX1200 full rack mainframe or combined with other switch modules to create a flexible switching configuration that can cover a wide range of applications.

CONNECTOR PINS AND SIGNALS

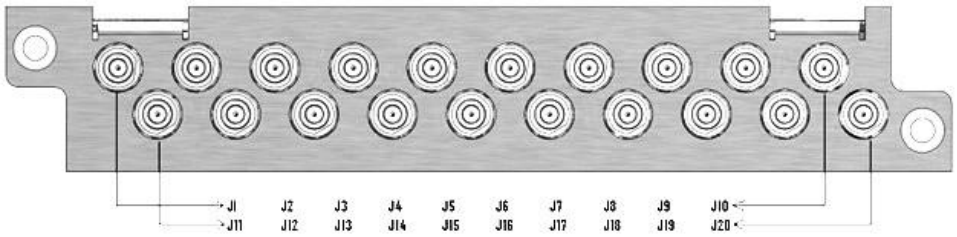


FIGURE 4-59: EX1200-6301 FRONT PANEL (FRONT VIEW)

EX1200-6301 Front Panel	
Pin	**Signal**
J1	CH1_1
J2	CH1_2
J3	CH1_COM
J4	CH1_3
J5	CH1_4
J6	CH2_1
J7	CH2_2
J8	CH2_COM
J9	CH2_3
J10	CH2_4
J11	CH3_1
J12	CH3_2
J13	CH3_COM
J14	CH3_3
J15	CH3_4
J16	CH4_1
J17	CH4_2
J18	CH4_COM
J19	CH4_3
J20	CH4_4

TABLE 4-51: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM

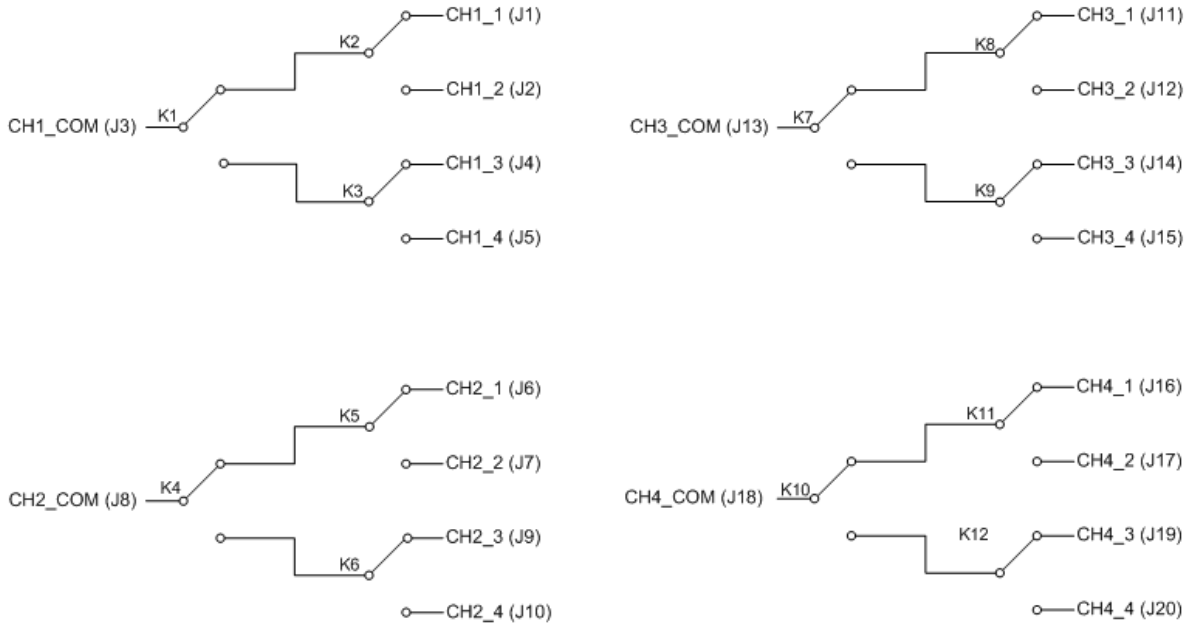


FIGURE 4-60: EX1200-6301 LOGICAL DIAGRAM

EX1200-6301 SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Four SP4T 50 Ω RF multiplexers, 3GHz
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	30 VDC
MAXIMUM SWITCHING CURRENT	
	0.5A
MAXIMUM SWITCHING POWER	
	10 W
RATED SWITCH OPERATIONS	
Mechanical	5×10^6
Electrical	1×10^5 (Full Load)
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 1 Ω
INSULATION RESISTANCE	
	1×10^9 Ω
BANDWIDTH (-3 dB)	
	3GHz (typical)
INSERTION LOSS (TYPICAL)	
1 GHz	< 0.5 dB
3 GHz	< 3.0 dB
CROSSTALK (TYPICAL)	
1 GHz	< -60 dB
3 GHz	< -55 dB
ISOLATION (TYPICAL)	
1 GHz	< -65 dB
3 GHz	< -55 dB
VSWR (TYPICAL)	
1 GHz	< 1.2:1
3 GHz	< 1.5:1

EX1200-6301T PLUG-IN MODULE

4 CHANNEL SP4T, SELF-TERMINATED RF MULTIPLEXER, 50 Ω, 3 GHZ

The EX1200-6301T is has on-board self-termination option and is designed with SMB male connectors for applications that require RF signal switching upto 3 GHz in a 50 Ω environment. Excellent crosstalk and isolation performance is achieved by using short low-loss coaxial runs from the connector directly to the relays. All modules are designed to avoid any unterminated stub effects improving overall signal integrity and enabling the construction of larger high frequency multiplexer configurations while maintaining bandwidth and VSWR.

Six of the modules can be accommodated in a single EX1200 full rack mainframe or combined with other switch modules to create a flexible switching configuration that can cover a wide range of applications.

CONNECTOR PINS AND SIGNALS

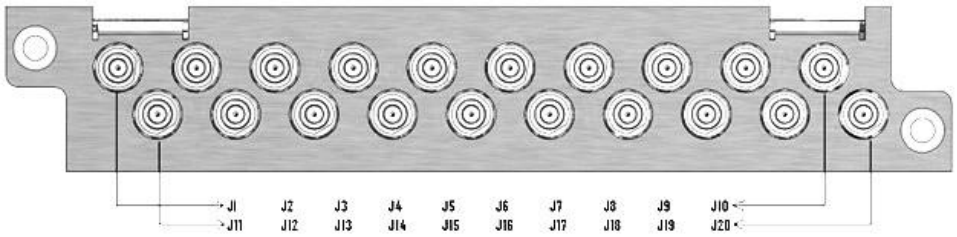
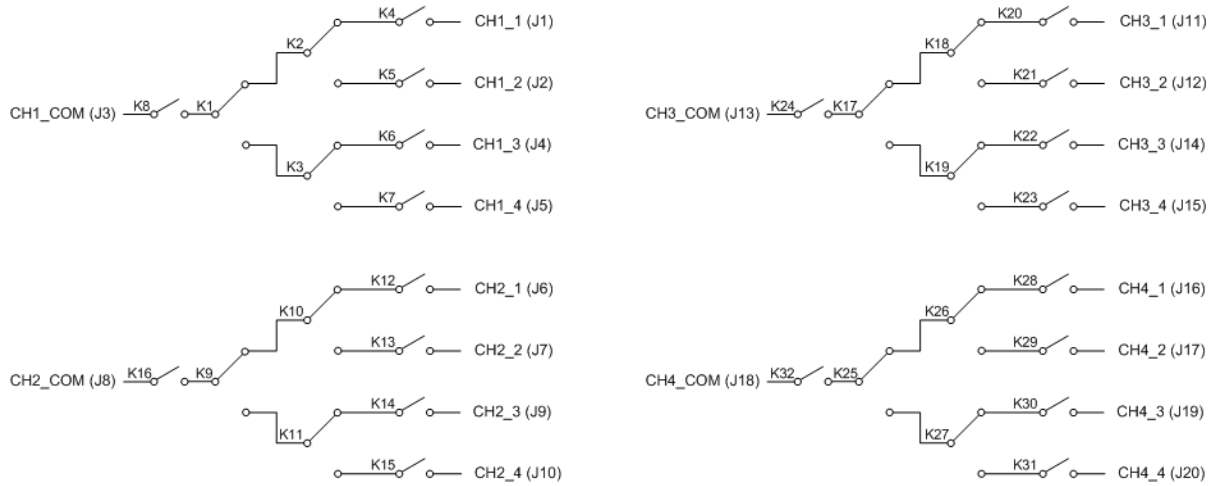


FIGURE 4-61: EX1200-6301T FRONT PANEL (FRONT VIEW)

EX1200-6301T Front Panel	
Pin	**Signal**
J1	CH1_1
J2	CH1_2
J3	CH1_COM
J4	CH1_3
J5	CH1_4
J6	CH2_1
J7	CH2_2
J8	CH2_COM
J9	CH2_3
J10	CH2_4
J11	CH3_1
J12	CH3_2
J13	CH3_COM
J14	CH3_3
J15	CH3_4
J16	CH4_1
J17	CH4_2
J18	CH4_COM
J19	CH4_3
J20	CH4_4

TABLE 4-52: CONNECTOR PINS & SIGNAL ASSIGNMENTS

LOGICAL DIAGRAM



NOTE: Channels (CHX_COM and CHX_X) are terminated when they are in open condition

FIGURE 4-62: EX1200-6301T LOGICAL DIAGRAM

EX1200-6301T SPECIFICATIONS

GENERAL SPECIFICATIONS	
CHANNEL COUNT	
	Four SP4T 50 Ω RF multiplexers, 3GHz, with onboard self-termination
RELAY TYPE	
	Electromechanical, fail-safe
MAXIMUM SWITCHING VOLTAGE	
	30 VDC
MAXIMUM SWITCHING CURRENT	
	0.5A
MAXIMUM SWITCHING POWER	
	10 W
RATED SWITCH OPERATIONS	
Mechanical	5×10^6
Electrical	1×10^5 (Full Load)
SWITCHING TIME	
	< 5 ms
PATH RESISTANCE	
	< 1 Ω
INSULATION RESISTANCE	
	1×10^9 Ω
BANDWIDTH (-3 dB)	
	3GHz (typical)
INSERTION LOSS (TYPICAL)	
1 GHz	< 0.5 dB
3 GHz	< 3.0 dB
CROSSTALK (TYPICAL)	
1 GHz	< -60 dB
3 GHz	< -55 dB
ISOLATION (TYPICAL)	
1 GHz	< -65 dB
3 GHz	< -55 dB
VSWR (TYPICAL)	
1 GHz	< 1.2:1
3 GHz	< 1.5:1

EX1200-7100 PLUG-IN MODULE

DC - 26 GHZ MICROWAVE SWITCH CARRIER AND RELAY DRIVER

The EX1200-7100 is a high-density microwave switch module carrier, designed for use with EX1200 mainframes, extending the platforms switching capabilities to the 26 GHz range. Each carrier can accommodate three miniature microwave switch modules to provide added system flexibility. Each microwave switch can be removed, replaced, or relocated in the carrier by the user allowing for easy configuration and maintenance.

In addition to using the four specially-designed switch modules, the carrier can also be used as a relay driver to control external microwave relays that are not compatible with the EX1200-7100 carrier. Each carrier provides six control lines compatible with 24 V logic.

The EX1200-7100 module occupies two plug-in-modules slot space and can be mixed and matched with other EX1200 plug-in modules to configure high-density customized switching solutions. Approximately 54 switch points can be switched within a 1U rack space, providing exceptional density without signal integrity degradation.

The EX1200-7100 series has been priced to help reduce the cost of microwave switching by at least 20% over existing solutions. Switches are competitively priced to satisfy the lower frequency cellular switching market needs.

The EX1200-7100 can be controlled programmatically using IviSwtch-compliant calls. Refer to the host driver documentation for additional details. Logical diagrams are provided for each switch module which identify how the front connector and rear connector pins.

FRONT PANEL ENCLOSURE

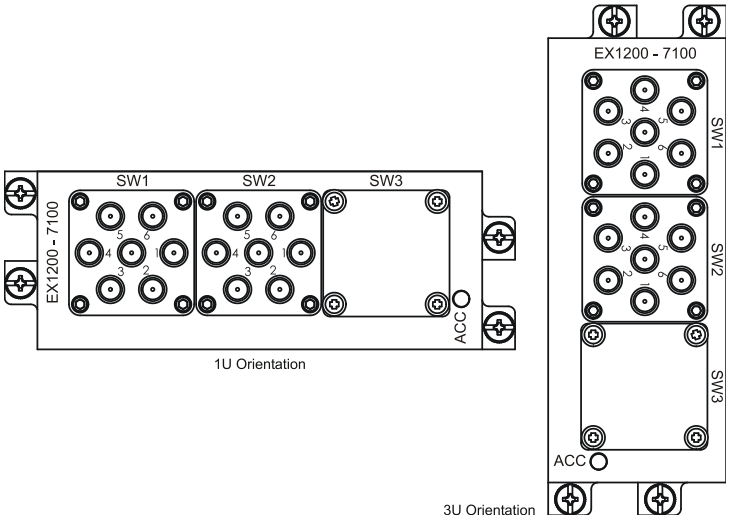


FIGURE 4-63: EX1200-7100 FRONT PANEL WITH TWO 7106 MODULES (FRONT VIEW)

MICROWAVE SWITCH MODULES

VTI provides four microwave switch modules that can be used with the EX1200 carrier. Table 4- shows the models and their switching functionality.

Model	Type
7102	Dual SPDT
7104	SP4T
7106	SP6T
7122	Transfer

TABLE 4-53: EX1200-7100 PLUG-IN MICROWAVE SWITCH MODULES

These modules utilize a 4-bit ID that allows the user to change the location and type of relay in any given carrier slot as needed. When the modules are inserted, the EX1200-7100 carrier reads this ID and the information is automatically updated and reflected in the Soft Front Panel (for more information on the EX1200 Series soft front panels, please refer to the *EX1200 Series User's Manual*, P/N: 82-0127-000.) The following information provides these module's logical diagrams as well as front and rear panel connector information.

7102 Microwave Module

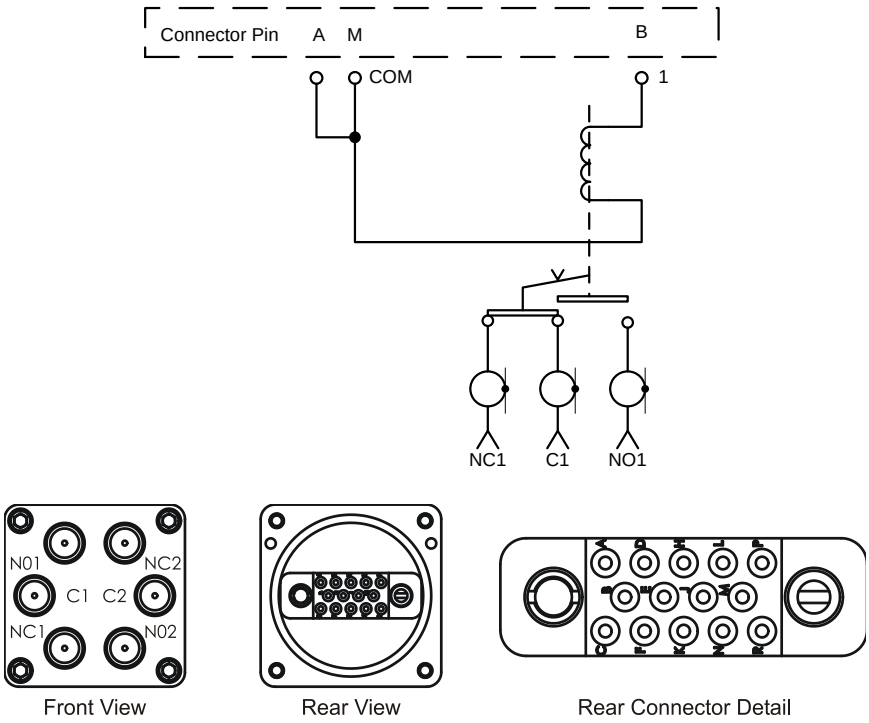


FIGURE 4-64: 7102 LOGICAL DIAGRAM, SIGNALS, AND SWITCH DETAILS

7104 Microwave Module

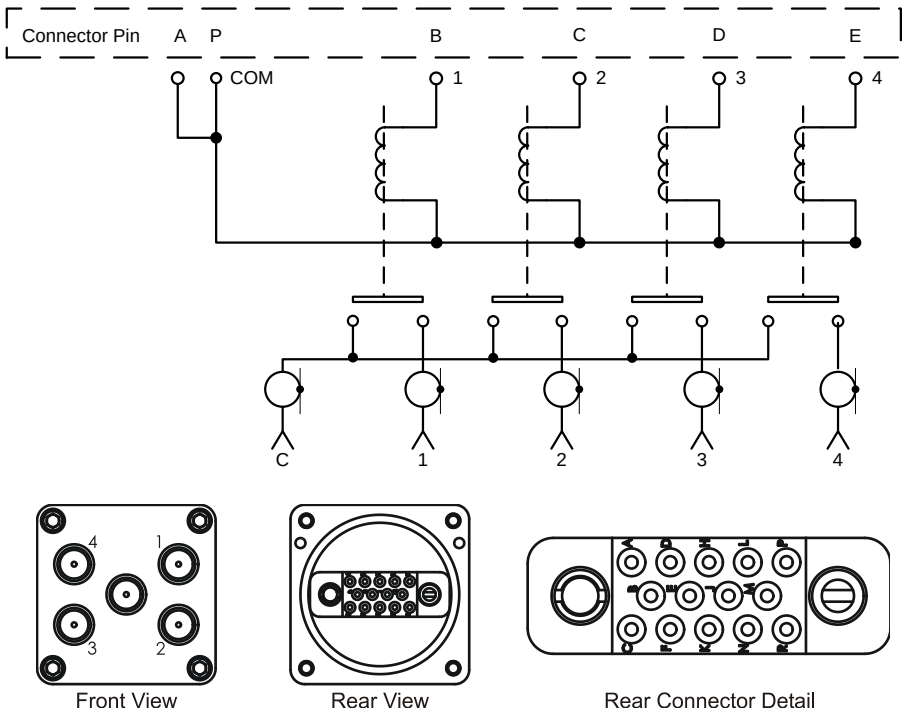


FIGURE 4-65: 7104 LOGICAL DIAGRAM, SIGNALS, AND SWITCH DETAILS

7106 Microwave Module

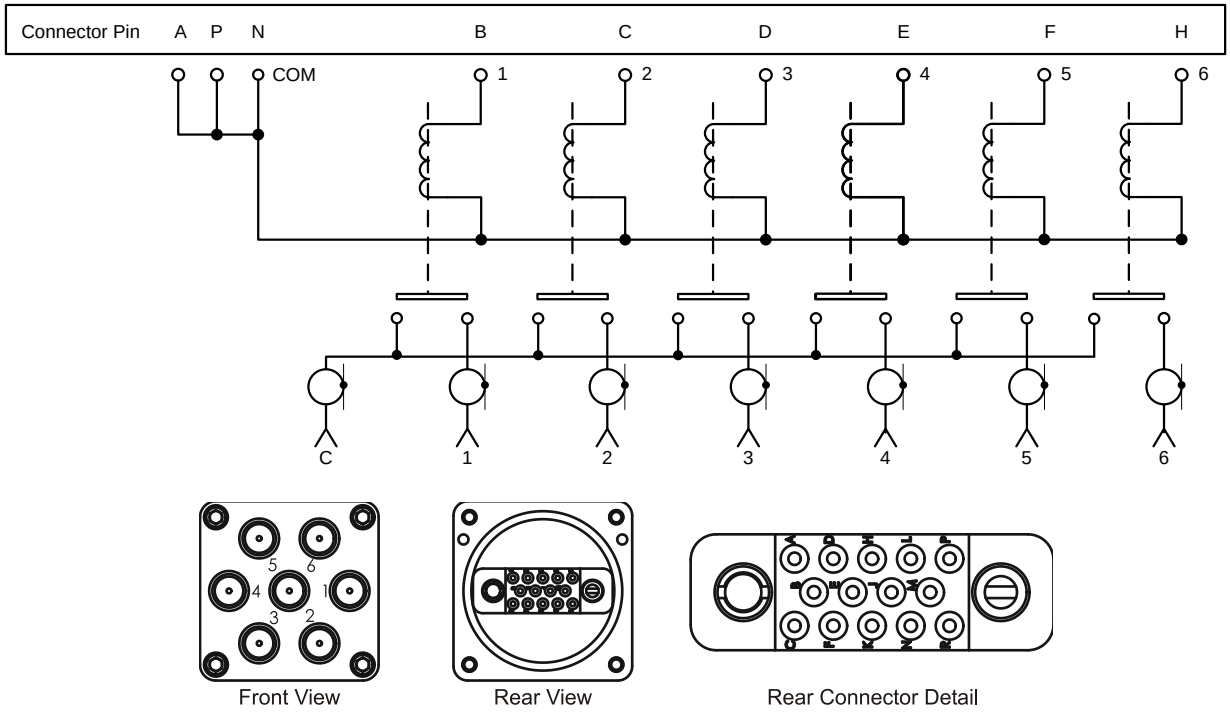


FIGURE 4-66: 7106 LOGICAL DIAGRAM, SIGNALS, AND SWITCH DETAILS

7122 Microwave Module

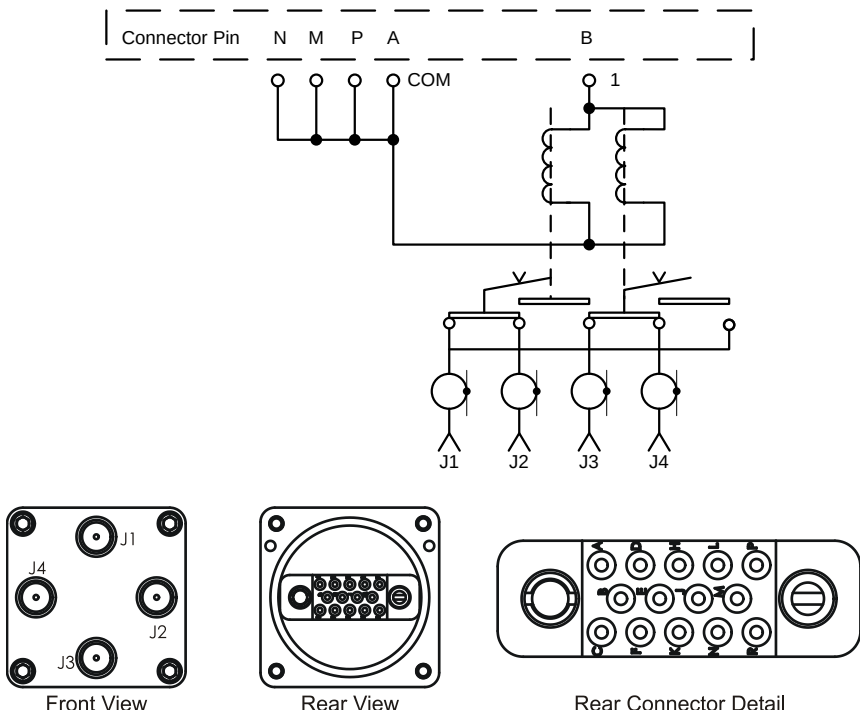


FIGURE 4-67: 7122 LOGICAL DIAGRAM, SIGNALS, AND SWITCH DETAILS

Installing a Switch Module

Prior to a switch module into the EX1200-7100 enclosure, ensure that has been removed from the mainframe. If the enclosure is already installed into an EX1200 mainframe, remove it from the mainframe to facilitate installation. Next, slide the module into the enclosure and carefully ensure that the guide pins on the enclosure mate with the pins on the module. Once the guide pins are aligned, firmly push the module into the mating connector until the module is seated flush in the enclosure. Install the four socket head cap screw's to complete the installation.

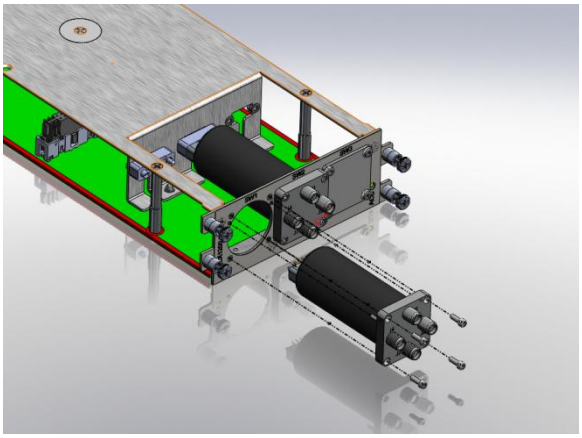


FIGURE 4-68: INSTALLING A SWITCH MODULE

EX1200-7100 CARRIER FRONT PANEL CONNECTORS

The EX1200-7100 carrier provides six lines of control for external microwave switches. Using a pass through adapter (VTI P/N: 70-0146-026), external microwave switches can be connected to the three 14-pin connectors located inside the carrier. The signals for the connector pins are shown in Table 4-2.

Connector Pin	Signal
A	+24V
B	RELAY 1
C	RELAY 2
D	RELAY 3
E	RELAY 4
F	RELAY 5
H	RELAY 6
J	Not Used
K	Not Used
L	Not Used
M	ID0
N	ID1
P	ID2
R	ID3

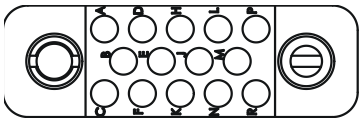


TABLE 4-54: EX1200-7100 CONNECTOR PINS AND SIGNALS

EX1200-7100 SOFT FRONT PANEL

Although soft front panel (SFP) operation is detailed in the *EX1200 Series User's Manual*, the EX1200-7100 has a unique input/output interface that is available when a pass through adapter is used. When the SFP is initially viewed, a PIO*x_y* (**PIO1_2** in Figure 4-5) the slot is viewed. From here, the user can enter the value that will be input or output by the relay driver. When **PIO1_2** is clicked, the slot expands to show the seven bits that are controlled when the input/output is set.

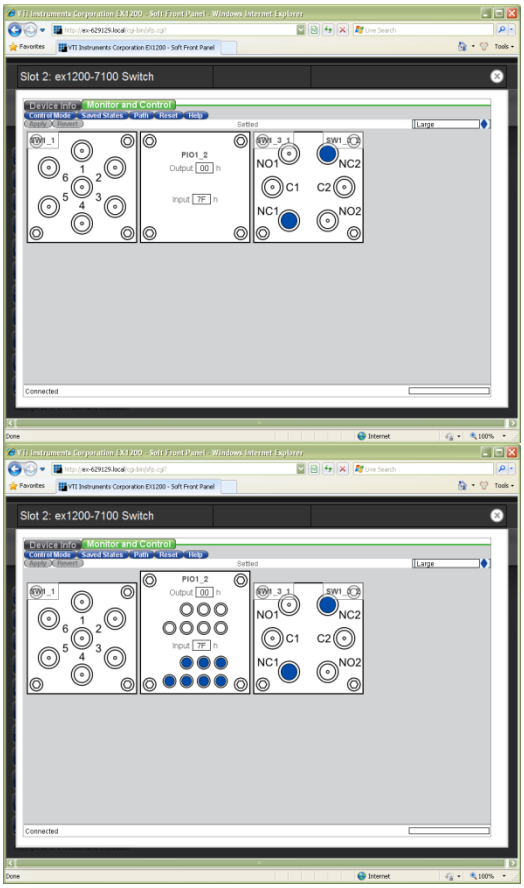


FIGURE 4-69: STANDARD (LEFT) AND EXPANDED (RIGHT) IMAGE FOR PIO1_2 PORT

EX1200-7100 SPECIFICATIONS

RF PERFORMANCE SPECIFICATIONS					
Frequency (GHz)	DC – 4	4 – 8	8 – 12	12 – 18	18 – 26
VSWR	1.25:1	1.35:1	1.40:1	1.50:1	1.8:1
Insertion loss (dB max)	0.20	0.30	0.40	0.50	0.80
Isolation (dB min)	70	65	60	60	50
RF power (CW)	100	70	60	45	30

ADDITIONAL SPECIFICATIONS	
Maximum operating voltage	24 V dc
Maximum current rating (carrier)	1 A
Maximum current per switch	
7102/7104/7106	140 mA @ nominal voltage and 25 °C
7122	280 mA @ nominal voltage and 25 °C
Switching time	20 ms (maximum)
Operating mode	
7102/7104	Failsafe
7106	Normally open
7122	Transfer, failsafe
Switching sequence	Break-Before-Make
Operating life	2,000,000 cycles per position minimum

APPENDIX A

POWER CONSUMPTION AND WEIGHT

REFERENCE TABLES

The following reference table provides power consumption and weight information for the EX1200 series card. The EX1200 mainframe power specifications are also provided to assist in determining available power.

POWER SPECIFICATIONS			
AVAILABLE POWER			
EX1202/06/62/66	120 W		
EX1208/68*	120 W per segment		
**The EX12x8 mainframe is powered by four power supplies and each power supply is used for a finite number of mainframe slots. For more information, see* Appendix B *of the* EX1200 Series User's Manual.			
MAXIMUM CURRENT PER RAIL[1,2]	**3.3 V**	**5 V**	**24 V**
EX1202/EX1206	6.00 A	13.420 A	3.320 A
EX1262/EX1266	6.00 A	13.410 A	3.074 A
EX1208/68 (Slots 1 – 5)	14.99 A	13.582 A	2.950 A
EX1208/68 (Slots 6 – 10)	14.99 A	13.362 A	2.950 A
EX1208/68(Slots 11 – 16)	14.99 A	13.355 A	2.950 A
Note[1]: For more information on calculating power consumption, please refer to the Power Consumption discussion *in* Appendix B *of the* EX1200 Series User's Manual.			
Note[2]: These values indicate the maximum current provided by the power supply. This value is limited by the carrying capacity for that rail. See the Maximum Current Carrying Capacity per Slot *specification of the* EX1200 Series User's Manual *for more information.*			

Switch Module	+3.3 V	+5 V	+24 V	Weight lbs (kg)	Notes
EX1200-2001	0.131 A	0.0037 A*	0 A	1.47 (0.67)	*Add 75 mA per relay closure on 5 V
EX1200-2002	0.131 A	0.0037 A*	0 A	0.49 (0.23)	*Add 75 mA per relay closure on 5 V
EX1200-2007A	0.135 A	0.0041 A*	0 A	1.05 (0.48)	*Add 40 mA per relay closure on 5 V
EX1200-2008H	0.140 A	0.005 A*	0 A	0.76 (0.35)	*Add 17 mA per relay closure on 5 V
EX1200-3001	0.135 A	0.0041 A*	0 A	1.01 (0.46)	*Add 26 mA per relay closure on 5 V
EX1200-3048	0.129 A	0.0041 A*	0 A	0.39 (0.18)	*Add 23 mA per relay closure on 5 V
EX1200-3048S	0.131 A	0.0041 A	0 A	0.28 (0.13)	N/A
EX1200-3072	0.129 A	0.0041 A*	0 A	0.35 (0.16)	*Add 23 mA per relay closure on 5 V
EX1200-3096	0.140 A	0.005 A*	0 A	0.83 (0.38)	*Add 28 mA per relay closure on 5 V
EX1200-3164	0.129 A	0.0041 A*	0 A	0.44 (0.20)	*Add 23 mA per relay closure on 5 V
EX1200-4003	0.137 A	0.0040 A*	0 A	0.40 (0.18)	*Add 25 mA per relay closure on 5 V
EX1200-4128	0.129 A	0.0041 A*	0 A	0.69 (0.32)	*Add 28 mA per relay closure on 5 V
EX1200-4260	0.014 A	0.005 A*	0 A	Unavailable	*Add 28 mA per relay closure on 5 V
EX1200-4264	0.014 A	0.005 A*	0 A	Unavailable	*Add 28 mA per relay closure on 5 V
EX1200-5001	0.129 A	0.0041 A*	0 A	0.41 (0.19)	*Add 23 mA per relay closure on 5 V
EX1200-5002	0.129 A	0.0041 A*	0 A	0.33 (0.15)	*Add 23 mA per relay closure on 5 V
EX1200-5006	0.140 A	0.005 A*	0 A	0.79 (0.36)	*Add 28 mA per relay closure on 5 V
EX1200-6101	0.140 A	0.005 A*	0 A	0.93 (0.42)	*Add 28 mA per relay closure on 5 V
EX1200-6111	0.140 A	0.005 A*	0 A	0.74 (0.34)	*Add 28 mA per relay closure on 5 V
EX1200-6216	0.129 A	0.0041 A*	0 A	0.90 (0.41)	*Add 28 mA per relay closure on 5 V
EX1200-6216HV	0.140 A	0.005 A*	0 A	0.94 (0.43)	*Add 67 mA per relay closure on 5 V
EX1200-7100	0.131 A	0.0037 A	0 A	0.63 (0.29)	Values for carrier only
7102 plug-in	0.131 A	0.0037 A	0.005A*	0.25 (0.12)	*Add 140 mA per relay closure on 24 V

Switch Module	+3.3 V	+5 V	+24 V	Weight lbs (kg)	Notes
7104 plug-in	0.131 A	0.0037 A	0.005A*	0.25 (0.12)	*Add 140 mA per relay closure on 24 V
7106 plug-in	0.131 A	0.0037 A	0.005A*	0.25 (0.12)	*Add 140 mA per relay closure on 24 V
7122 plug-in	0.131 A	0.0037 A	0.005A*	0.25 (0.12)	*Add 280 mA per relay closure on 24 V

APPENDIX B

SWITCH CARD ACCESSORIES

LIST OF ACCESSORIES

The following tables provide mating connector, strain relief, crimp pin, and other related accessories for the connectors used with the EX1200 series switch cards.

26-pin Connector

These accessories should be used with the EX1200-6101, EX1200-6102, EX1200-6111, and EX1200-6216, and EX1200-6216HV.

ACCESSORIES	
MATING CONNECTOR	
Description	26-pin connector and housing (2 required)
VTI Part Number	70-0150-000
Manufacturer/Part Number	Amp 201359-1 (connector) and 201845-1 (strain relief)
FERRULE KIT	
Description	10-pin/ferrule kit (RG 316 50 Ω)
VTI Part Number	70-0149-000
Manufacturer/Part Number	Amp 1-332056-0 (ferrule) and 226537-1 (contact)
Description	10-pin/ferrule kit (RG 178 50 Ω)
VTI Part Number	70-0149-001
Manufacturer/Part Number	Amp 1-332057-0 (ferrule) and 226537-2 (contact)
CRIMP TOOL (FOR RG316 COAX)	
Description	Crimp tool, coax RG316 (50 Ω)
VTI Part Number	46-0018-000
Manufacturer/Part Number	Amp 69656-2
CRIMP TOOL (FOR RG178 COAX)	
Description	Crimp tool, coax RG178 (50 Ω)
VTI Part Number	46-0018-001
Manufacturer/Part Number	Amp 69656
EXTRACTION TOOL	
Description	Tool, pin extractor, size 16 contact, AMP M series
VTI Part Number	46-0021-000
Manufacturer/Part Number	Amp 305183

41-pin Connector

These accessories should be used with the EX1200-2001 and EX1200-2002.

ACCESSORIES	
CONNECTOR KIT	
Description	Connector kit (includes 1 each connector and backshell plus 44 pins)
VTI Part Number	70-0190-001
CONNECTOR INFORMATION	
Description	Connector, power, female with backshell, insulated, 41 PLC
VTI Part Number	27-0087-041
Manufacturer/Part Number	Positronics GMCT41F0E100J0
CRIMP PIN	
Description	Contact, female, crimp, power connector, 14 - 16 GA (Order qty: 44 per board)
VTI Part Number	27-0087-000
Manufacturer/Part Number	Positronics FC114N2/AA
CRIMP TOOL INFORMATION	
Description	Crimp tool and turret head
VTI Part Number	46-0012-000
Manufacturer/Part Number	Positronics 9501 and 9502-1
INSERTION TOOL	
Description	Tool, contact insertion, size 16 contact, AMP M series
VTI Part Number	46-0014-000
EXTRACTION TOOL	
Description	Tool, pin extractor, power/coaxial
VTI Part Number	46-0015-000
UNTERMINATED CABLE ASSEMBLY	
Description	41-pin, unterminated cable assembly, 3 ft
VTI Part Number	70-0363-506

104-pin Connector

These accessories should be used with the EX1200-3048, EX1200-3048S, EX1200-4003, and EX1200-5002.

ACCESSORIES	
MATING CONNECTOR KIT	
Description	104-pin HD D-sub mating connector and backshell, with 3 ft unterminated 24 AWG wire
VTI Part Number	70-0363-501
MATING CONNECTOR	
Description	104-pin HD D-sub mating connector with hood and pins, fixed contacts (no crimp tool required)
VTI Part Number	27-0389-104
Manufacturer/Part Number	Positronics ODD104M210GEX
MATING CONNECTOR	
Description	104-pin HD D-sub mating connector, backshell and pins, crimp style
VTI Part Number	27-0390-104
Manufacturer/Part Number	Positronics ODD104M10Y0X
CRIMP TOOL	
Description	Crimp tooling, includes handle and positioner, 22 – 28 AWG
VTI Part Number	70-0297-001
Manufacturer/Part Number	Positronics 9507 (tool) and 9502-4-0-0 (positioner)
UNTERMINATED CABLE ASSEMBLY	
Description	104-pin, unterminated cable assembly, 3 ft
VTI Part Number	70-0363-501
TERMINAL BLOCK (EX1200-3048, EX1200-3048S, AND EX1200-4003 ONLY)	
Description	EX1200-TB104, differential module
VTI Part Number	70-0367-001
TERMINAL BLOCK (EX1200-5002 ONLY)	
Description	EX1200-TB104SE, single-ended module
VTI Part Number	70-0367-003

160-pin Connector

These accessories should be used with the EX1200-2007A, EX1200-2008H, EX1200-3001, EX1200-3001DS, EX1200-3072, EX1200-3164, EX1200-4128, EX1200-4260, EX1200-4264, EX1200-5001, and EX1200-5006. Because the EX1200-2007A and EX1200-2008H are 160-pin connectors that have been modified to have only 80 pins, quantities should be adjusted accordingly.

ACCESSORIES	
STRAIN RELIEF BRACKET KIT (INCLUDES CONNECTOR)	
VTI Part Number	70-0363-504 (recommended accessory)
STRAIN RELIEF BRACKET KIT (WITHOUT CONNECTOR)	
VTI Part Number	70-0363-503
CRIMP PIN	
VTI Part Number	52-0109-000 (includes 100 crimp pins)
Manufacturer/Part Number	ERNI 234064
MATING CONNECTOR	
VTI Part Number	27-0088-160 (one per board)
Manufacturer/Part Number	ERNI 024070
CRIMP TOOL (DIN)	
VTI Part Number	46-0010-000
Manufacturer/Part Number	ERNI 014374
EXTRACTION TOOL (DIN)	
VTI Part Number	46-0011-000
Manufacturer/Part Number	ERNI 471555
UNTERMINATED CABLE ASSEMBLY (ALL 160-PIN CONNECTORS)	
Description	160-pin, unterminated cable assembly, 3 ft
VTI Part Number	70-0363-505
UNTERMINATED CABLE ASSEMBLY (ALL 80-PIN CONNECTORS – HIGH-VOLTAGE)	
Description	160-pin to 80-pin, unterminated cable assembly, 3 ft
VTI Part Number	70-0363-507
TERMINAL BLOCK INFORMATION (EX1200-3072 ONLY)	
Description	EX1200-TB160-1, differential module
VTI Part Number	70-0367-002
TERMINAL BLOCK INFORMATION (EX1200-3164 ONLY)	
Description	EX1200-TB160-2, differential module
VTI Part Number	70-0367-008
TERMINAL BLOCK INFORMATION (EX1200-3001 ONLY)	
Description	EX1200-TB160-3, differential module
VTI Part Number	70-0367-009
TERMINAL BLOCK INFORMATION (EX1200-4128, EX1200-5001, EX1200-7500 ONLY)	
Description	EX1200-TB160SE, single-ended module
VTI Part Number	70-0367-005

200-pin Connector

These accessories should be used with the EX1200-3096.

ACCESSORIES	
STRAIN RELIEF BRACKET	
VTI Part Number	41-0472-034
MATING CONNECTOR	
Description	200-pin mating connector
VTI Part Number	27-0388-200
Manufacturer/Part Number	Molex 0717193000
CRIMP PIN	
VTI Part Number	27-0391-050
Manufacturer/Part Number	Molex 0717154002
TERMINAL BLOCK	
Description	EX1200-TB200, differential module
VTI Part Number	70-0367-004

50-pin Connector

These accessories should be used with the EX1200-5004.

ACCESSORIES	
CONNECTOR KIT	
Description	Connector kit includes two 50-pin connector, two backshells, and 104 crimp pins
VTI Part Number	52-0195-000
MATING CONNECTOR	
Description	50-pin mating connector and backshells – two required
VTI Part Number	52-0196-000
Manufacturer/Part Number	Positronic SGMC50MOE1OOJO
HAND CRIMP TOOL	
VTI Part Number	46-0024-000
Manufacturer/Part Number	Positronic 9507
CONTACT INSERTION TOOL	
VTI Part Number	46-0037-000
Manufacturer/Part Number	Positronic 9099-1
CONTACT EXTRACTION TOOL	
VTI Part Number	46-0036-000
Manufacturer/Part Number	Positronic 9081-1
TURRET HEAD POSITIONER TOOL	
VTI Part Number	46-0025-000
Manufacturer/Part Number	Positronic 9502-12